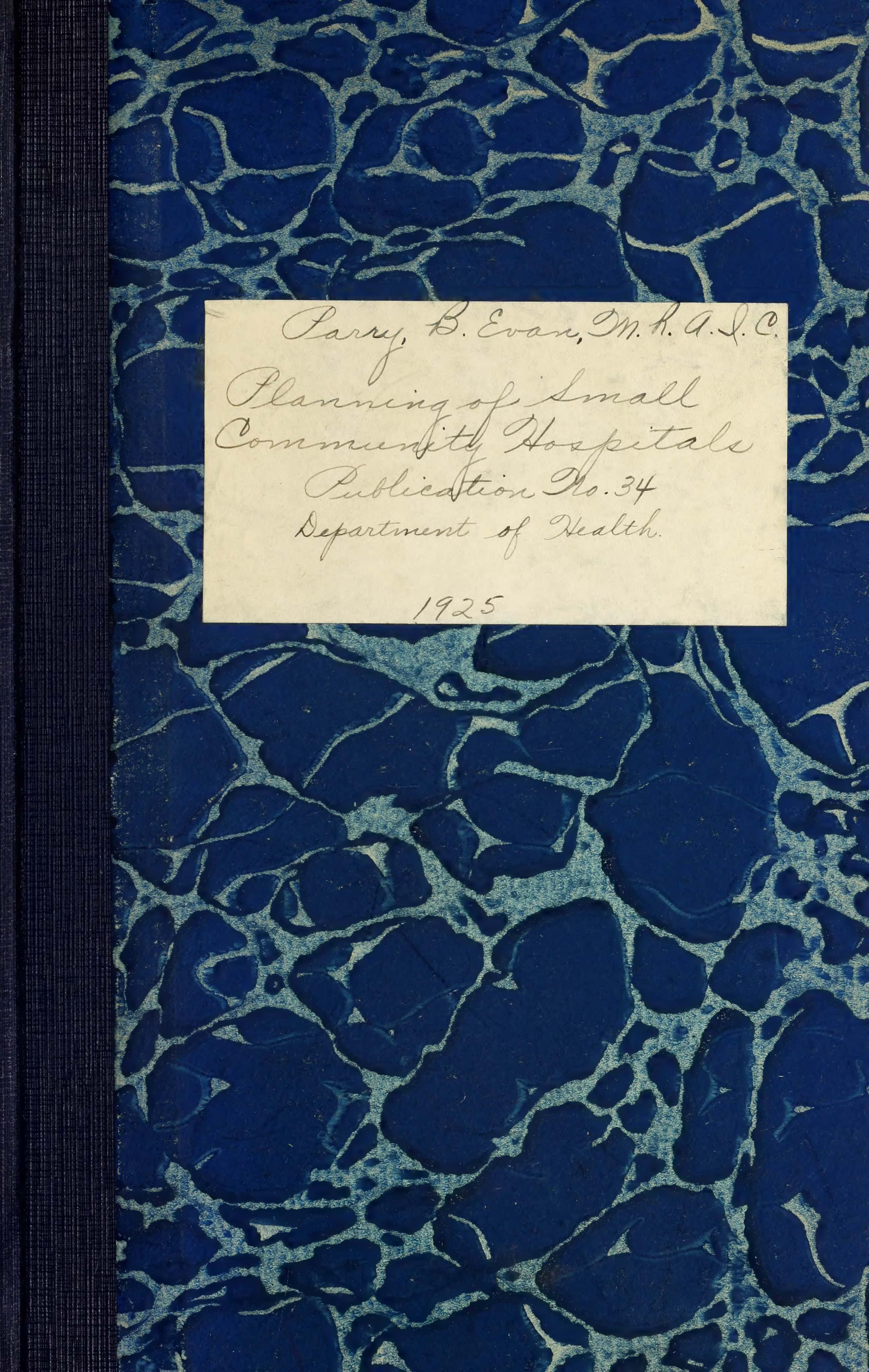

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Planning of Small
Community Hospitals
Publication No. 34
Department of Health

1925

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PUBLICATION
No. 34

CANADA

PLANNING OF SMALL COMMUNITY HOSPITALS

BY
B. EVAN PARRY, M.R.A.I.C.
Supervising Architect

ISSUED BY
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1925

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PREFACE

The succinctness of this brochure may possibly be open to criticism in so far as it may be charged that sufficient information is not given to enable hospital trustees and others interested in the subject to determine by "a short cut" the capacity and cost of a hospital suitable for the community they are interested in.

Since "short cuts" are dangerous, it would seem that if success is to be attained in the development of the problem of small community hospitals close study must be given to all its different phases from inception to completion, and only thus will efficient and successful results be accomplished.

Therefore if the principles expounded in this publication are taken as milestones upon the road to success in the consummation of the problem, its object will have been achieved.

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PLANNING OF SMALL COMMUNITY HOSPITALS

BY

B. EVAN PARRY, M.R.A.I.C., *Supervising Architect*

PART I

INTRODUCTION

> "Without theory, practice must be a blind doing of what somebody else—tradition, authority or accident—has directed."
>
> —*Moore.*

It has been computed by an eminent hospital authority that there should be five to seven beds for every thousand population for general hospital purposes, whereas in the year 1923 the number of beds available throughout the Dominion averaged but one to every 347 of population.

Fifty-six per cent of the population of Canada live in the rural districts, many of which are located at a distance from hospital service, incidentally making it costly and detrimental to acute physical conditions to transport the patients to large hospital centres. The question, therefore, of distribution of hospitals throughout rural districts is one of moment and urgency.

The following communication received from the chairman of a hospital board aptly describes the small town community hospital problem throughout the Dominion.

"The average community hospital to be found in the small town generally originates through some good soul getting the idea that the town should have a hospital. The rolling of the ball is started and in a comparatively short time a fund of ten to twenty thousand dollars is raised. This individual is confronted with the problem as to what should be done, with no more idea than the man in the moon as to how to go about it. Sometimes a house that is already built, but vacant, is used and added to from year to year as the requirements of the hospital increase. In other cases the local contractor is called in, who prepares a set of plans, tenders on the work, and usually gets the contract. Possibly no fault may be found with the contractor as a contractor, but when it comes to laying out the internal part of a hospital he is usually as green as grass. However, this is not admitted by the contractor, but a journey is made to a neighbouring town to find out how the problem is tackled there and with some minor alterations of his own builds a hospital that may look all right as a building from the outside, but is a regular jack-pot inside.

"Doubtless the result is better than no hospital at all. Nevertheless for the same amount of money a proper institution could be built combining a minimum cost of construction, a minimum cost of operation, and everything conveniently arranged for the hospitalization of disease in every form.

"It must be conceded that almost all the small town hospitals are losing money, going in the hole every year, owing to the fact, in part, that the verandah was built first and the hospital afterwards. It is admitted that such institutions do good work, nevertheless better work could be accomplished at a less ratio of cost if the original installation was intelligently planned and all details taken into consideration before commencement of the project.

"The chairman of the board of trustees, and the board itself, in the smaller town is composed of the citizens, all interested in the work in an evanescent or superficial manner, quite willing to devote a certain amount of their time to the handling of the hospital affairs, and if data could be obtained from some source that would show definitely what a town of five thousand population should build or what a town of ten thousand population should build, would certainly avail themselves of the information, and something would be accomplished both valuable and useful to every small town throughout the Dominion."

Actuated therefore by the demand for such information together with repeated requests from different sections of the Dominion, this brochure has been compiled having in mind the object to present in a succinct manner the principles involved in the small community hospital problem.

Fig. 1—Great War Memorial Hospital, Perth, Ont.

The precedent formed upon past experience would more clearly emphasize the truism that the conception and development of an idea which involves a building is the why of the plan, therefore it becomes incumbent upon those directly interested to understand the why of the plan and in order to comprehend this the conception and development of the underlying idea must be explained.

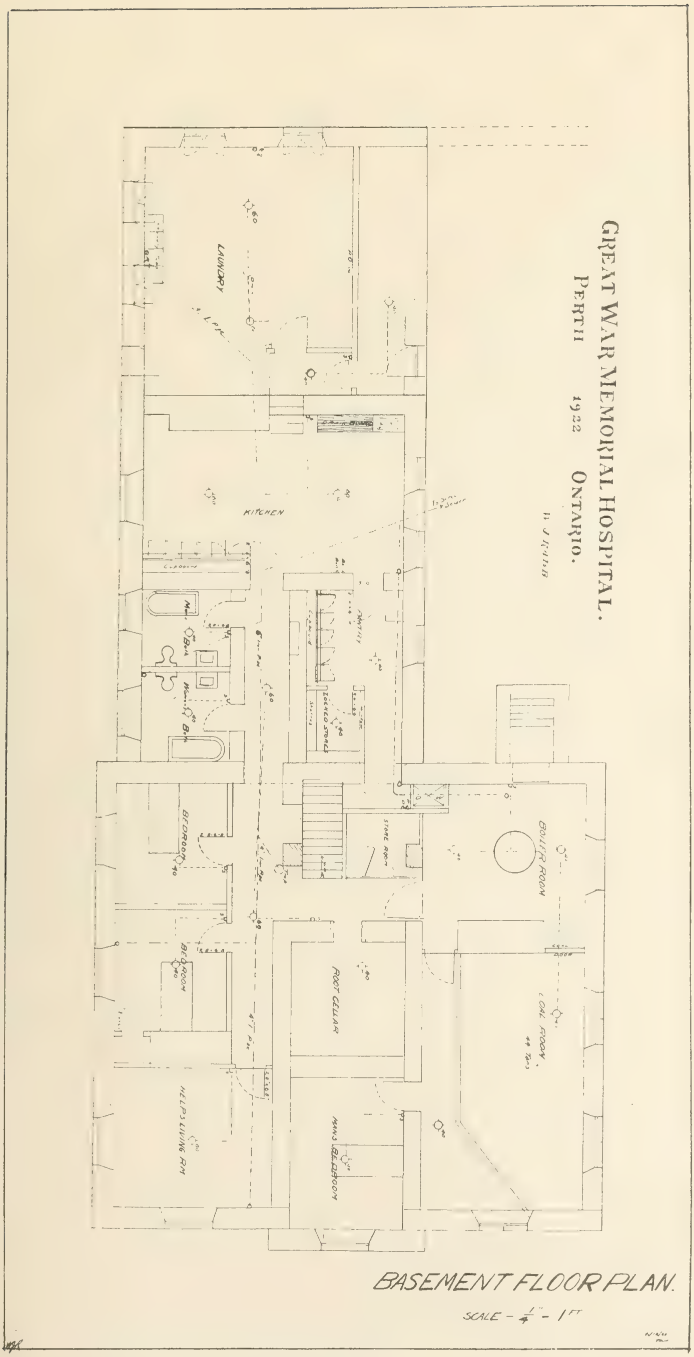

GREAT WAR MEMORIAL HOSPITAL.
PERTH 1922 ONTARIO.
LAUNDRY
KITCHEN
PANTRY
LOCKED STORE
BEDROOM
BEDROOM
HELPS LIVING RM
ROOT CELLAR
MANS BEDROOM
STORE ROOM
BOILER ROOM
COAL ROOM
BASEMENT FLOOR PLAN.
SCALE - 1/4" - 1FT

Fig. 1a.

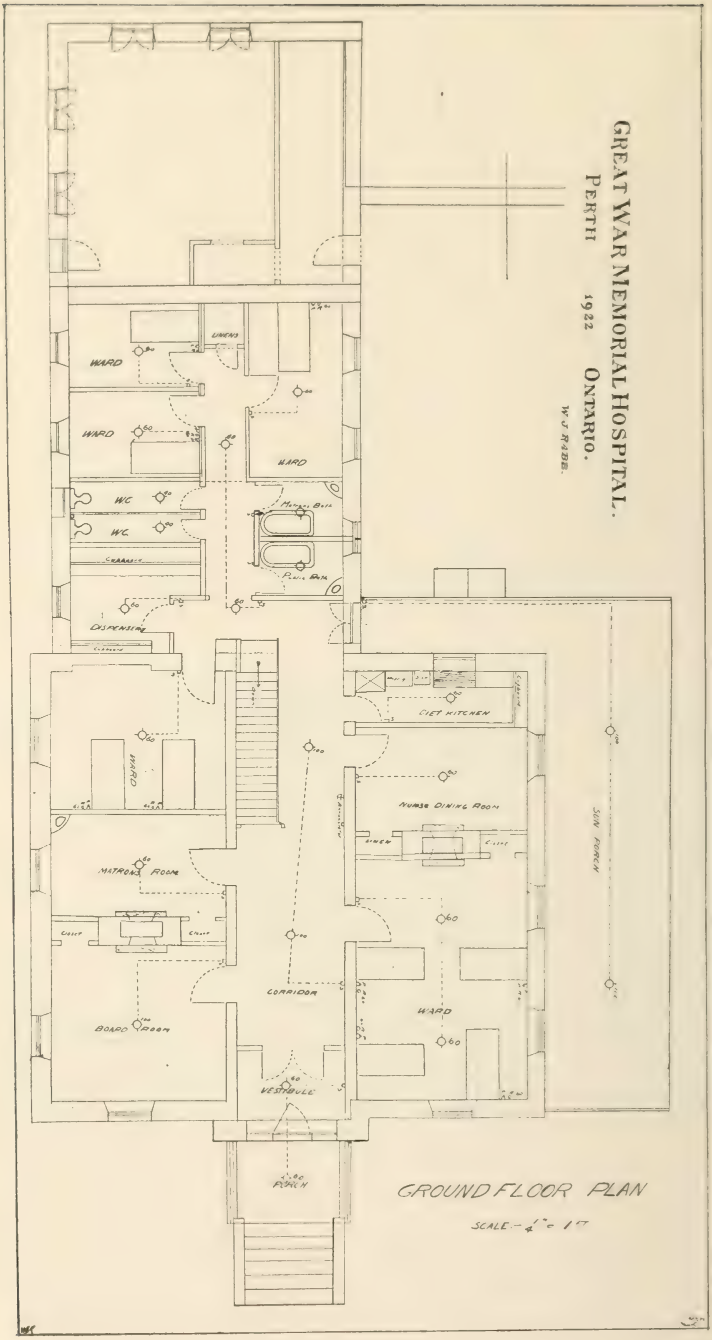

GREAT WAR MEMORIAL HOSPITAL.
PERTH 1922 ONTARIO.
W J RABB.
WARD
LINENS
WARD
WARD
W.C.
W.C.
CUPBOARD
Matron's Bath
Public Bath
DISPENSARY
CUPBOARD
DIET KITCHEN
WARD
NURSE DINING ROOM
LINEN
CLOSET
SUN PORCH
MATRON'S ROOM
CLOSET
CLOSET
CORRIDOR
BOARD ROOM
WARD
VESTIBULE
PORCH
GROUND FLOOR PLAN
SCALE.—1/4" = 1 FT.

Fig. 1b.

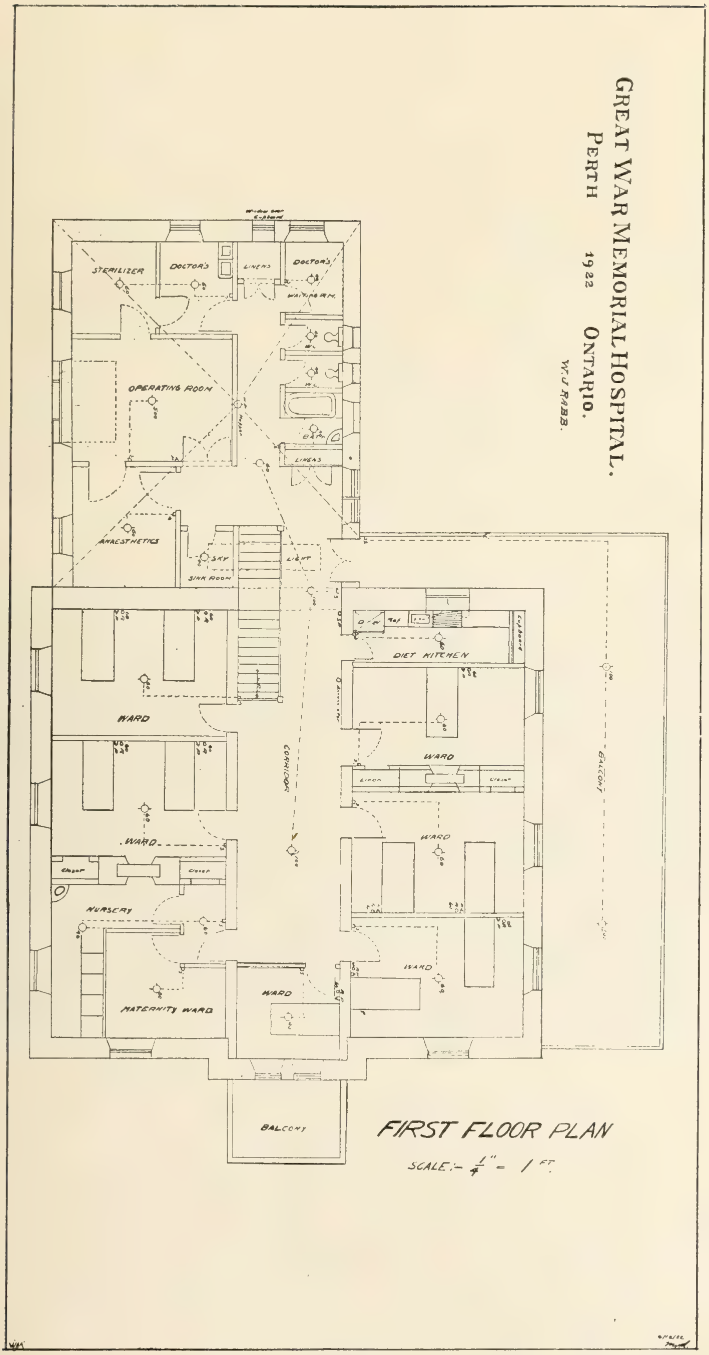

GREAT WAR MEMORIAL HOSPITAL.
PERTH 1922 ONTARIO.
W.J RABB.
STERILIZER
DOCTOR'S
LINENS
DOCTOR'S
WAITING RM.
W.C.
W.C.
OPERATING ROOM
BATH
LINENS
ANAESTHETICS
SKY LIGHT
SINK ROOM
DIET KITCHEN
WARD
WARD
CORRIDOR
WARD
Linen
Closet
WARD
WARD
Closet
Closet
NURSERY
WARD
MATERNITY WARD
BALCONY
BALCONY
FIRST FLOOR PLAN
SCALE:- 1/4" = 1 FT.

Fig. 1c.

When this principle is appreciated by hospital trustees, superintendents, architects and others interested in hospitalization, the hospitals of Canada will fulfil their destiny.

Figs. 1, 1a, 1b, 1c illustrate a hospital where a private residence has been remodelled with most excellent effect for the purposes intended and is such that it can be added to from time to time and in the consummation of the final scheme presents accommodation for hospitalization purposes suitable for a community such as obtains in this particular district.

It will be obvious that criticism can be levelled at the plan from the point of view of modern hospital planning, but nevertheless this is a case where by careful study and intelligent co-ordination of the various interests involved a good result has been obtained.

The town of Perth, Ontario, like other towns had for many years felt the need of a hospital not only for the town itself but for the surrounding community, even although there were two hospitals each of fifty bed capacity situate in a town within twelve miles distant.

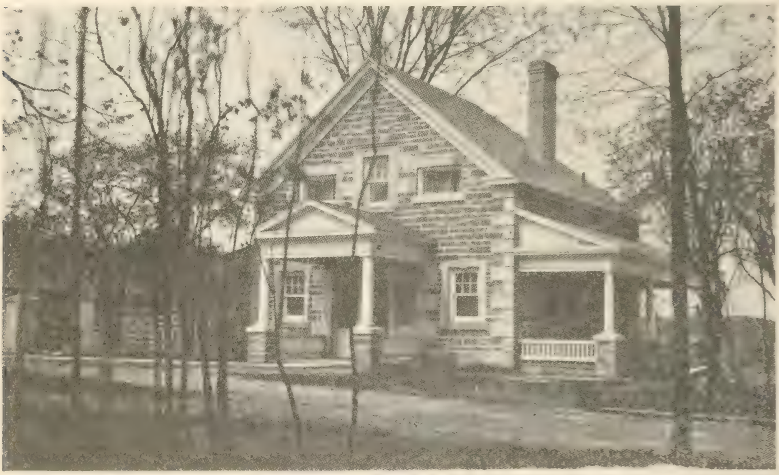


Fig. 1d—Great War Memorial Hospital, Nurses' Home, Perth, Ont.

In the autumn of 1919 the Perth Upon Tay Branch of the G.W.V.A. made a proposal that the projected memorial should take the form of a hospital, thus typifying in fact the service which had been given by those who had fallen, whereupon a committee was appointed, such members being selected from citizens of the town, care being taken that all the various churches and municipalities surrounding the town were represented. The various townships which would be served by the hospital were asked to contribute funds, the said funds to be raised by by-law and levied with the taxes. The amounts requested from each township were based on the population of the township, and the subsequent operation of the hospital has shown that the number of patients in the hospital are about fifty per cent from the town and fifty per cent from the surrounding country.

The hospital committee secured a site of an area of four and a third acres situate in the residential section of the town, whereon a stone residence existed, as also a stone coach house. The house was very substantially constructed and the plan of such character that lent itself admirably for adaptation to hospital purposes. The coach house was converted into a picturesque and suitable residence for the nursing staff (see Fig. 1d) and a wood shed was converted into a laundry.

The capacity of the hospital is that of twenty beds, with an emergency accommodation of an additional ten.

The purchase price of land and buildings amounted to $10,000, and that for reconstruction of hospital, including plumbing, heating and lighting $33,800. The reconstruction of nursing home, $3,200. Equipment, $6,600. Ground improvements and miscellaneous, $2,100. Total, $55,700.

Various societies and individuals such as the Red Cross Society, Imperial Order of the Daughters of the Empire, St. John's Ambulance Society, Perth Old Boys' Association, True Britons' Lodge, A.F. & A.M. and many prominent citizens contributed, which enabled the hospital to start under most auspicious conditions.

The population served is that of 12,000, which includes surrounding communities extending to a distance of thirty-five miles from the town.

In the operation of this hospital it has been experienced that from the commencement of activities the receipts have met expenses, which doubtless has been due to economic management.

PRELIMINARY SURVEY

Hospital trustees have many things to take into consideration when dealing with the problem of providing a new hospital. Primarily the question arises as to how many beds should be provided. Authorities, as already stated, make the computation of five to seven beds for each thousand of population. But any estimate should be based not only on the immediate problem of the community but on that of outlying small towns and surrounding country. Determination should be made for future growth, taking into consideration the present conditions and prospects for both industrial and rural development. The character of the country surrounding the proposed hospital determines in a large measure its size and equipment. The community wherein it is proposed to build the hospital is very often somewhat isolated and large centres situate at a distance where specialized hospital service is available. Under such circumstances it is advisable to provide a hospital with sufficient departments to serve all needs. Another factor is the nature of the prevailing business. Is it agricultural, industrial or mining? If industry or mining prevails, more attention must be paid to surgery, as also accommodation for emergency purposes. Wealth is also a factor to be considered, since it is reasonable to suppose that the hospital would get more patronage if generous provision was made for private rooms with baths, etc., and, incidentally, be the means of interesting the citizens to approve the expenditure incurred in the maintenance of an institution comparable to their own requirements.

> To be forewarned is to be forearmed.
>
> Therefore, don't travel around visiting other hospitals collecting a lot of ideas and expect to secure an efficient arrangement by patching them together.
>
> Don't take it for granted that some other community's problems so far as the hospital goes are the same as yours and will fit your needs. No two parallel cases are existent.
>
> Don't ask several architects to submit sketches in competition. Architecture, as in medicine, involves a correct diagnosis of your problem and cannot be given until all the symptoms are known and their relative importance established. The architects' sketches to mean anything of value must be the results of much study and many consultations.
>
> Don't start with the consideration of details. Get the basic physical arrangement correct first and the details will fall in line accordingly.

First establish the hospital policy then analyse this policy and outline the fundamental basic requirements according to their relative importance, then secure the services of the architects who know how to conserve nursing, medical services, provisions and supplies, and apply the facts of flexibility, bed capacity and simplicity of construction to your problem.

In the most unreasonable manner possible hospital boards more often than not call upon architects to design hospital buildings without first supplying the elements of a program. It is impossible to plan a hospital building to meet the particular situation without previously acquiring a knowledge of the needs of the institution, of its policies and of all of the working methods which are peculiar to it.

First of all the working facts should be realized which affect the hospital operation, i.e.:—

1. The conservation of time and energy of the nursing personnel and every inch of waste motion eliminated.

2. The time and energy of the medical staff or visiting doctors are valuable and must not be wasted.

3. The means of distribution of provisions and supplies as also the efficient handling thereof.

4. The securing of a flexible arrangement of the various facilities and a maximum occupation of beds.

5. The use of simple construction and arrangement of utilities to ensure the cost of maintenance being reduced to a minimum.

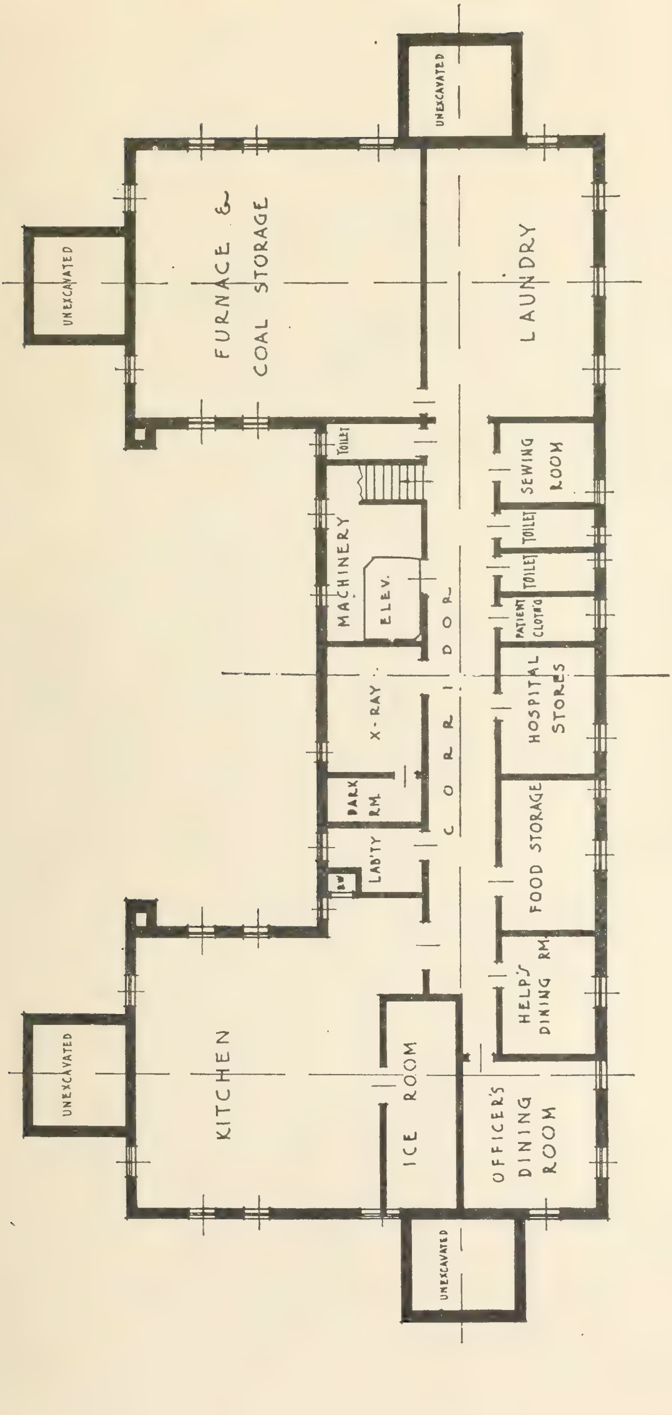


Fig. 2—Twenty-bed hospital. Basement.

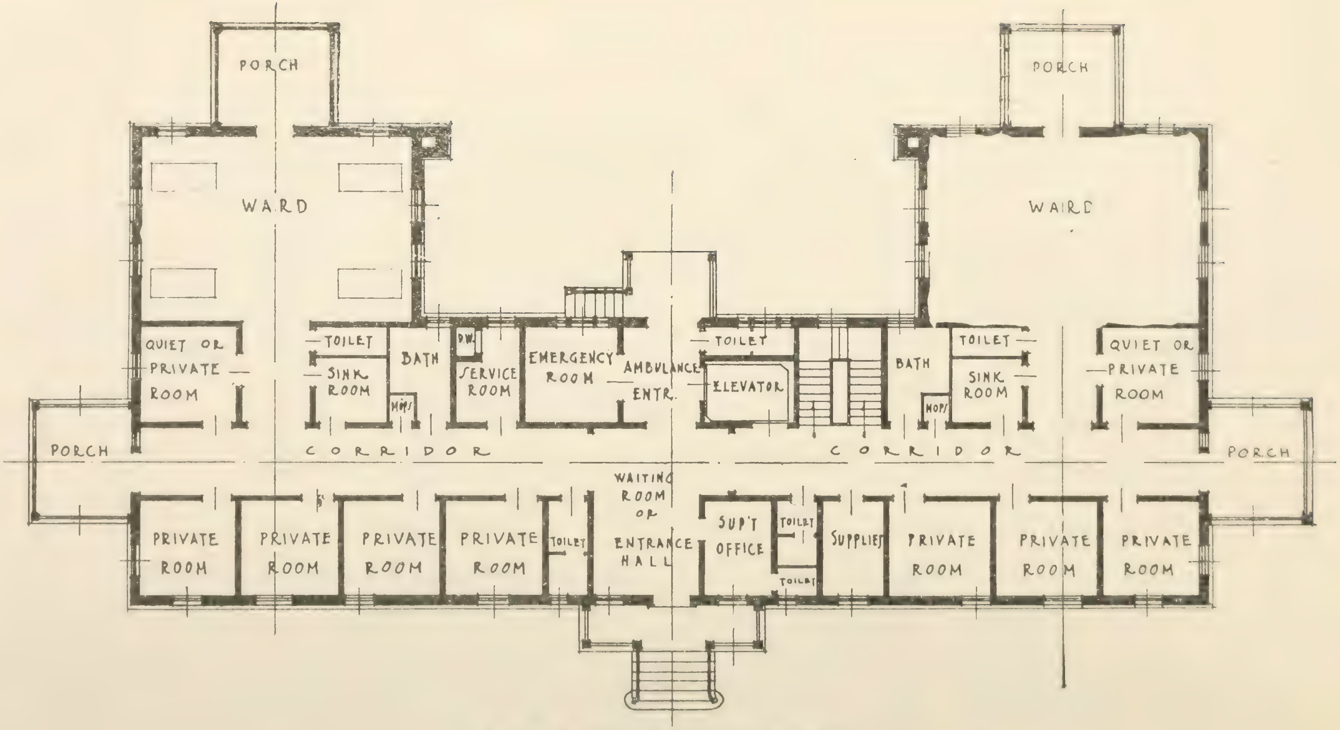


Fig. 2a Twenty-bed hospital. First floor.

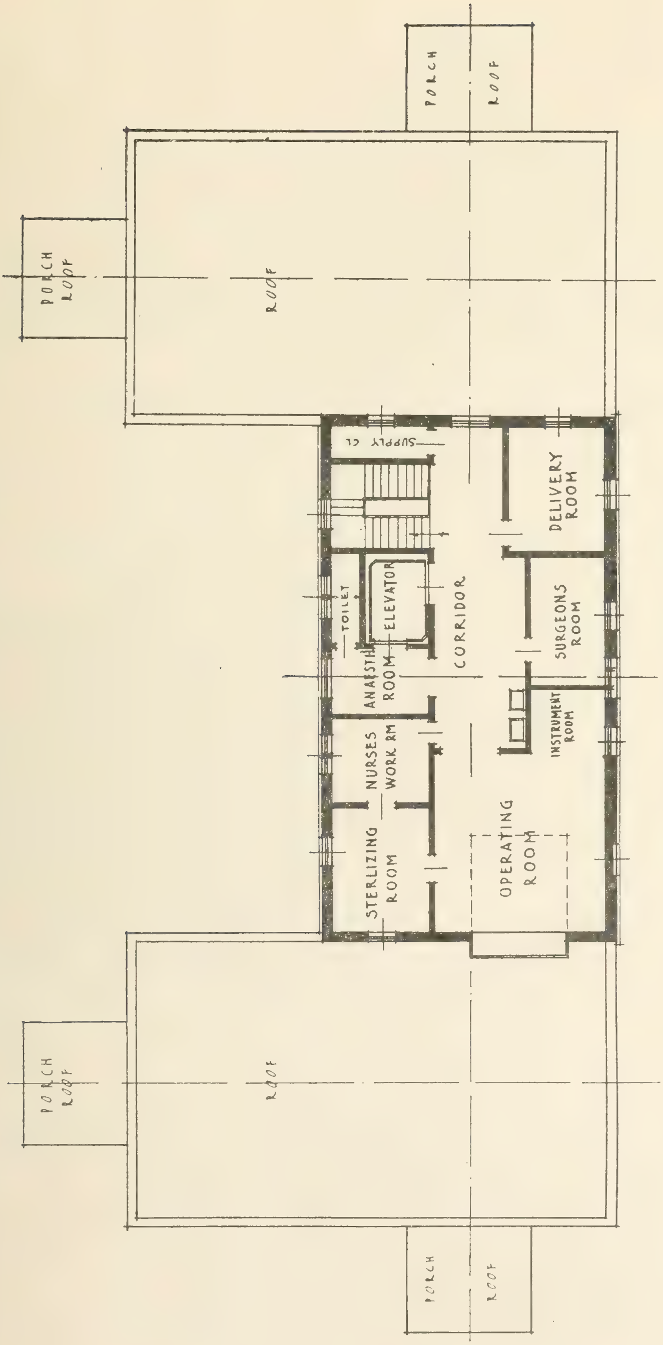


Fig. 2b—Twenty-bed hospital. Second floor.

After due consideration has been given to the foregoing facts the primary elements which enter into the preparation of a real hospital program should be studied, viz.:—

Capacity.—More often than not a stated figure given of bed capacity bears no real relation to actual needs and has been arrived at by those officials responsible having visited or administered a hospital in some other town, and without further consideration have arrived at the conclusion that a hospital of that size is the one required for their particular needs. Then, again, a conclusion is arrived at from a given sum of money to be expended whereupon approximate estimates are obtained of the cost per bed (a very misleading term) and the size of the hospital to be built is thus determined. So often hospital building schemes are ruined by the trustees not appreciating the advisability of proceeding in part with their hospital when funds are not sufficiently available to complete the project; losing sight of the fact that an ideal program may be formulated, having in mind its realization step by step.

Figures 3, 4, 5, 6, and 7 show arrangements for expansion.

The size of a hospital should be determined in the first place by the population it has to serve, particularly considering the numbers, character and rate of growth. Then again economic resources of the community together with the prevailing occupations, health hazards, housing of families, individuals without families, existing hospital facilities, sickness rate of the community, groups possessing special characteristics or customs and religious beliefs in so far as such beliefs may affect the attitude of the people toward the proposed sectarian or non-sectarian hospital. The author is conversant of a hospital having been built, which was not occupied or used for a period of over two years owing to a sectarian question having entered into its operation.

Having determined the number of beds, the question arises how these beds should be classified, socially and clinically. The proportion of the total number of patients whom are in a position to defray the cost of private rooms, those who desire or should be persuaded to accept semi-private accommodations and the number of public ward beds that may approximately be provided.

Do the incomes of a considerable part of the population in the community fluctuate and should the plan be so arranged that the line which separates the public from the semi-private ward as well as that which separates the semi-private from the private rooms service be readily altered to meet the circumstances.

The immediate building program and the future expansion of the hospital should be considered separately.

From the clinic point of view expansion should be anticipated in two directions, namely, in the case of a hospital at the outset being either unrepresented or incompletely represented with the various clinical specialties, the subsequent introduction of such departments may be taken for granted; whereas in the case of a hospital which is completely organized at the outset, the anticipated rate of growth of the different clinical divisions must be considered.

When considering the accommodation for maternity cases it must be borne in mind that the demand for such provision is increasing throughout the Dominion more rapidly than the demand for hospital beds for any other purpose. According to recent statistics published thirteen per cent of all of the children born in the U.S.A. are born in hospitals, although in a few communities the figure has risen to forty per cent.

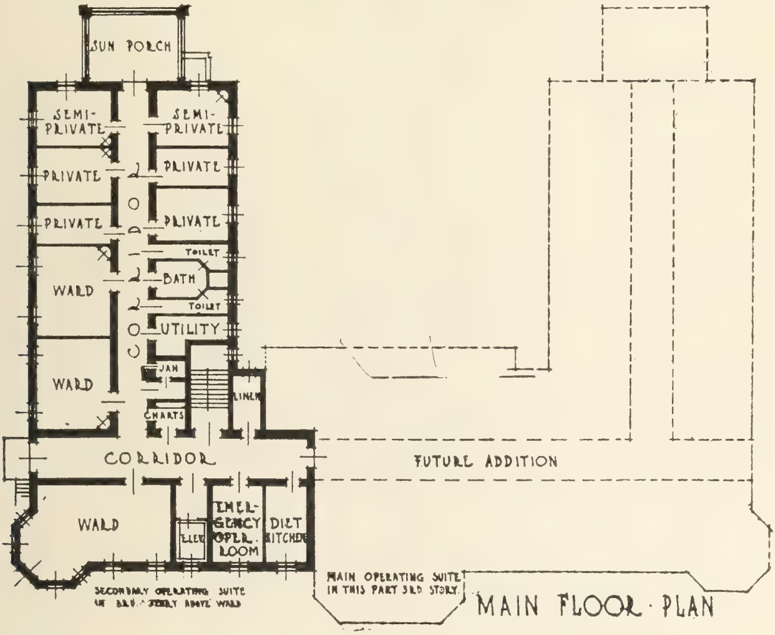


Fig. 3.

Receiving or observation wards which are difficult to classify clinically, owing to the miscellaneous character of the service which is demanded of them, nevertheless facilitate greatly the classification and handling of newly admitted cases. Therefore, their capacity should be decided and to arrive at an intelligent conclusion the hospital methods must be known. Emergency treatment room and the ambulance entrance should be in close proximity to the receiving wards and before the accommodation can be decided upon, informa-

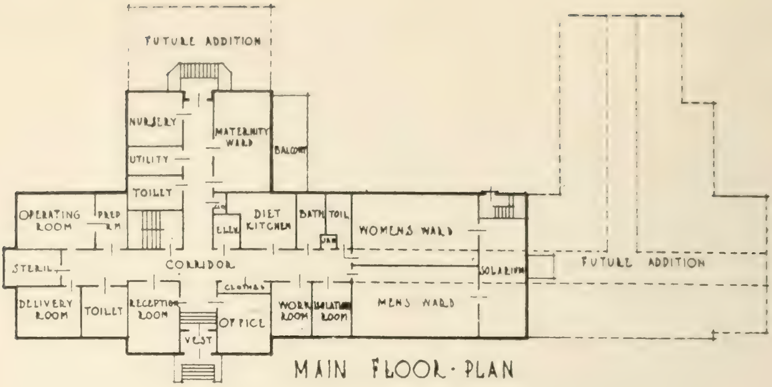


Fig. 4

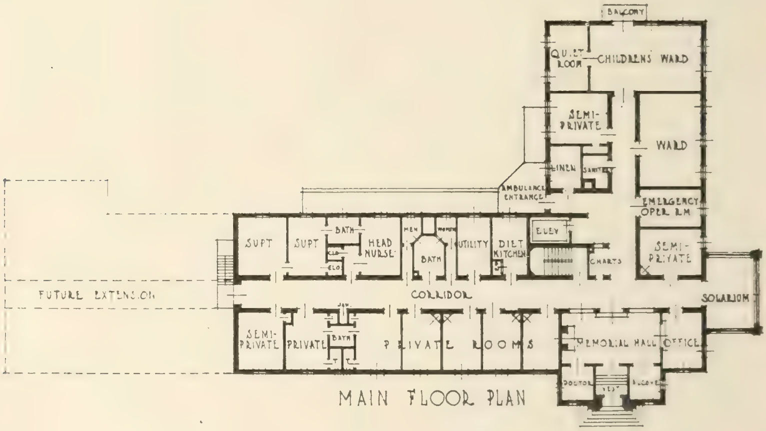


Fig. 5

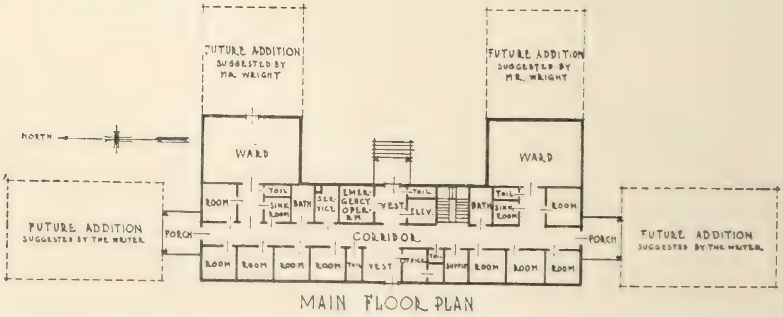


Fig. 6

tion must be given as to whether accidents are many or few in the community, which will more or less decide as to whether a single emergency treatment room will suffice.

Outpatients' department in which accommodation may be arranged for different groups of clinics to utilize the same rooms at different hours, thereby effecting a considerable saving in space and expense. Further, this department would seem to have a twofold advantage. First, it provides medical service for the poor, the sickness of whom at all times is prejudicial to any community caused by their depreciated capacity and, therefore, becoming a burden to not only themselves but the community and, further, represents a distinct economic loss. The second reason is that the outpatients' department provides clinical material for the physician, which increases the knowledge of the respective physicians and the sum of medical and surgical knowledge. It is more and more appreciated by physicians and supporters of hospitals that the hospital is logically a centre for the study of medical sciences, if it is to fully discharge its duties to the community, therefore provision should be made in the plan of every hospital for incorporating a department of this

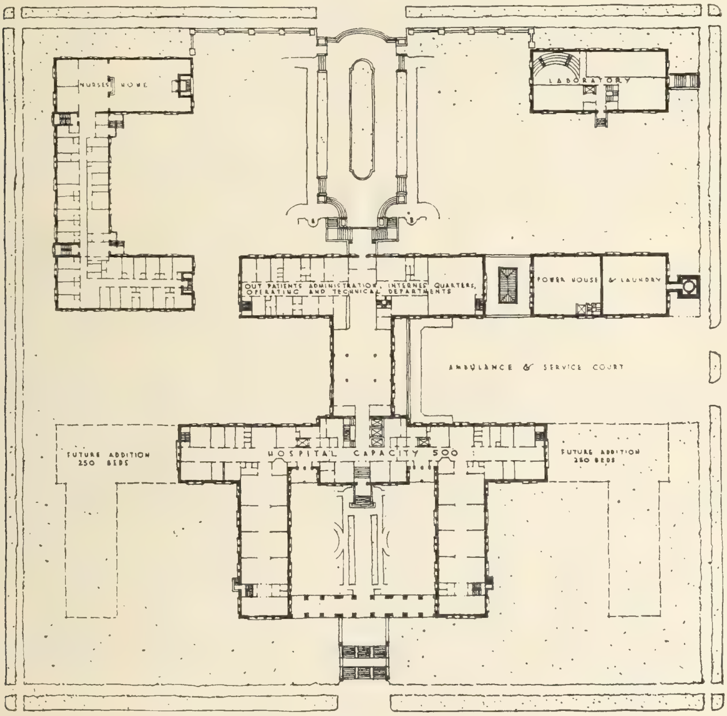


Fig. 7.

kind. If not, initial space should at least be set aside for its installation in the future.

Administrative or business section, in connection with which certain information should be available, namely, the number and functions of the executive officers and the method of receiving, registry and admitting patients; also the telephone system, accommodation for medical staff, more particularly concerning registration, lounging and locker room.

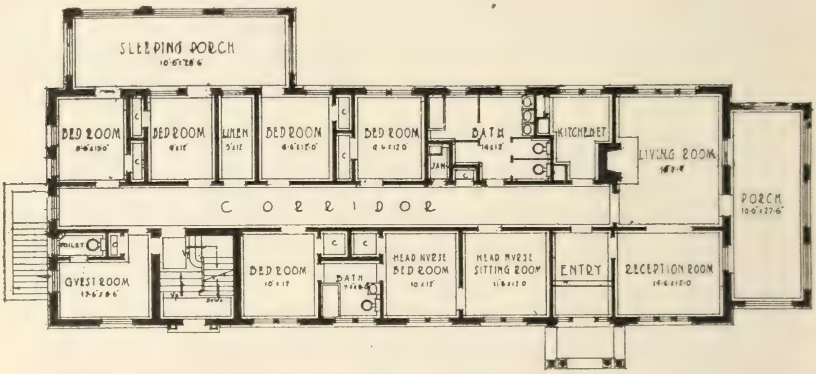


Fig. 8a—Nurses' Home—First floor plan.

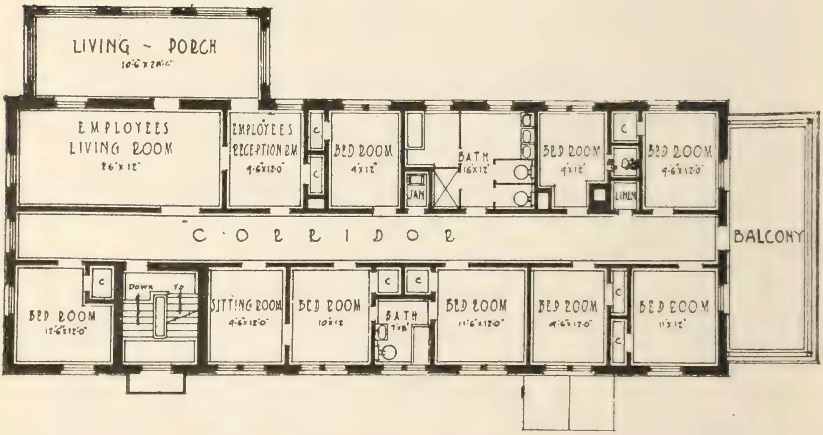


Fig. 8b—Nurses' Home—Second floor plan.

In the housing of the nursing staff, the principal things to be considered are, capacity, separate quarters for the superintendent or matron and night nurses, social rooms, sleeping porches, recreation both inside and outside, servants quarters, and dining room services. There is no doubt in the minds of those responsible for the administration of hospitals that a separate building or home for the nursing

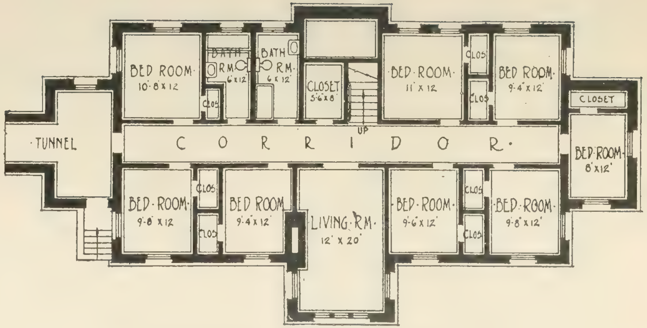


Fig. 9a—First floor plan, Nurses Home.

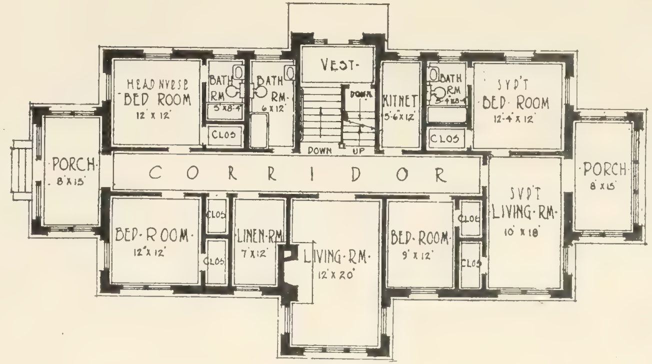


Fig. 9b—Second floor plan, Nurses Home.

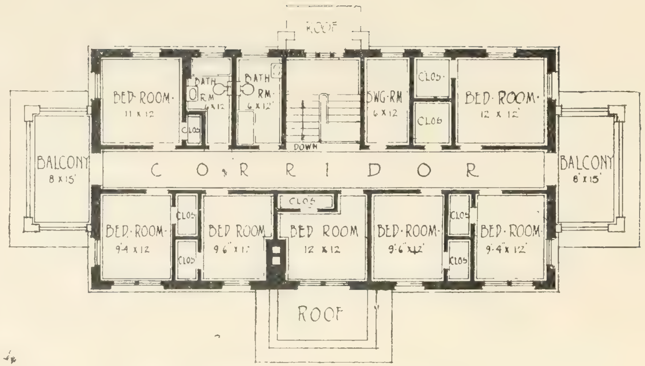


Fig. 9c—Third floor plan, Nurses Home.

staff (see Figs. 8a and 8b) promotes happiness and efficiency and wherever possible such separate building should be provided sufficiently removed from the hospital to permit the nurses to relax when off duty and to enjoy themselves in natural and reasonable pleasures without disturbing the patients in the hospital. In fact in the final analysis the accommodations for the nursing staff should be as nearly as possible like those of a good Canadian home. An interesting phase in connection with this point is that it has been increasingly difficult during the last few years to attract women to the profession of nursing. Due to this as also from the point of view of common justice and, further, if from nothing else than the economic standpoint, it is desirable to provide proper and adequate accommodation (see Figs. 9a, 9b and 9c).

Many hospitals are built with little thought of the accommodation required for the nurses who are often lodged in unsuitable rented quarters. The concensus of opinion held by superintendents would seem that single-bed rooms are more desirable than two-bed rooms. though possibly some nurses may suffer less from nostalgia during their freshmen years if they have room mates. Manifestly, every estimate of the cost of a hospital should include the cost of proper accommodation for the nurses with social, dining rooms, sewing rooms, laundry where they could do a little of that kind of work when necessary, and a sitting room in connection with the sleeping rooms where they can relax before retiring.

Further primary elements to be considered are the main kitchen service (after having determined the character of the food service), laundry planned in relation to the volume and kind of work to be done, patients' clothing, equipment (not losing sight of the fact that all wards are not alike in their requirements), light, power and fuel (coal or oil), considering the accessibility of reliable sources of supply which would cover the extent of the storage facilities. Ventilation, elevators, heating system, water supply, sewage disposal, fire protection, signal systems, garbage disposal, apparatus for sterilization, refrigeration, vacuum cleaning, illumination of wards, operating rooms, etc., care of mattresses, location and arrangement of store rooms, locations of work and repair shops, width of corridors and type of clothes chutes.

A practical hospital building program can be prepared if each of the foregoing elements are given consideration, and the architect is entitled to receive complete data on these points if he is expected to plan a hospital building that will adequately meet the needs of the community under consideration.

The hospital building shown on Figs. 10a, 10b, 10c, 10d and 10e was finished in October, 1923.

Bed capacity, fifty.

Total cost, $114,986.41, which includes fire hydrants on each floor, fire escapes, Bryant silent signal system, telephone system, Otis-Fensome passenger elevator, and the laying out of the grounds.

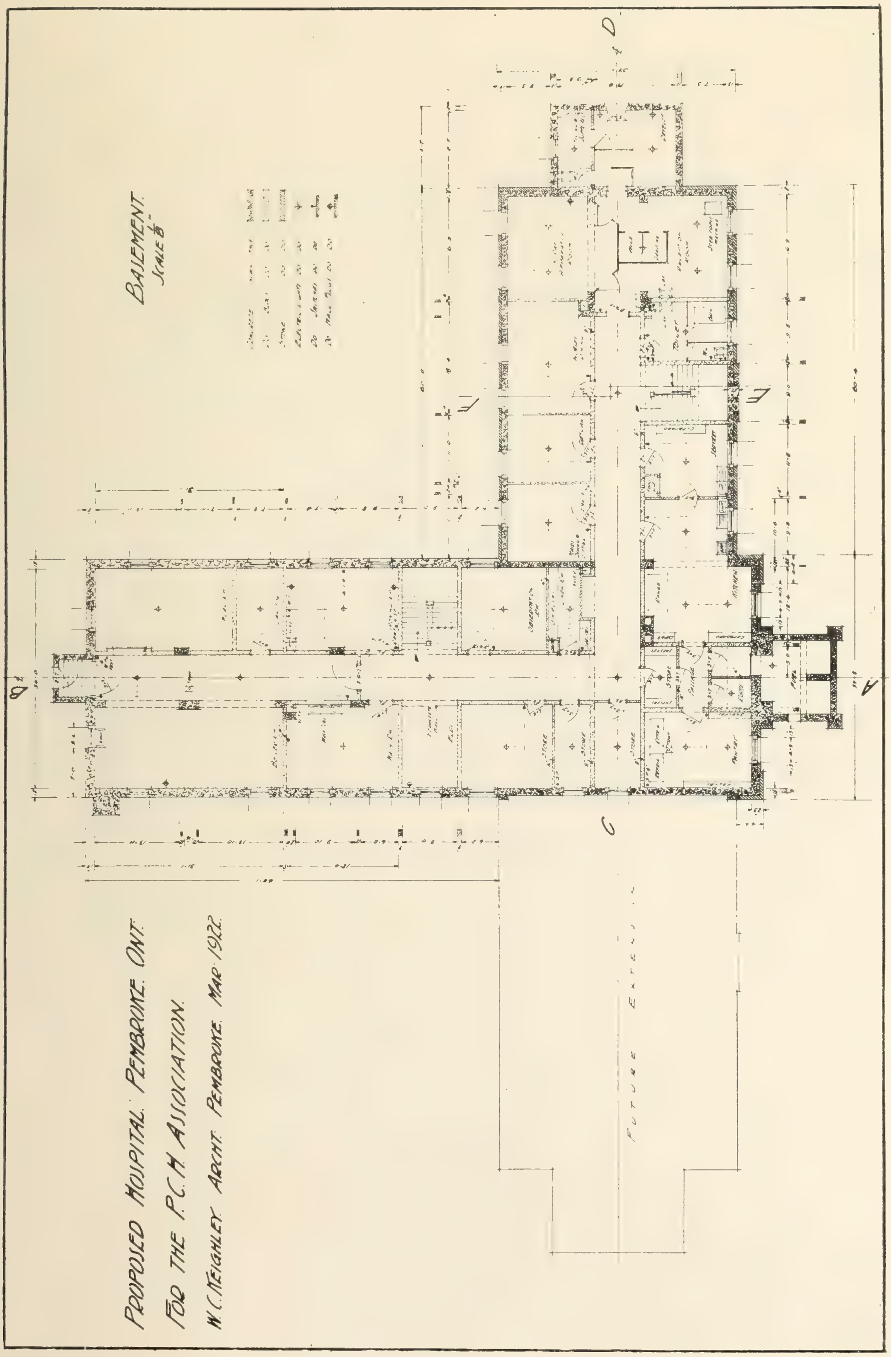

PROPOSED HOSPITAL. PEMBROKE. ONT.
FOR THE P.C.H. ASSOCIATION.
W.C. KEIGHLEY ARCHT. PEMBROKE. MAR 1922.
BASEMENT
SCALE 1/8"
FUTURE EXTENSION
KITCHEN
PANTRY
STORE
TOILET
A
C
D
E
F

Fig. 10a.

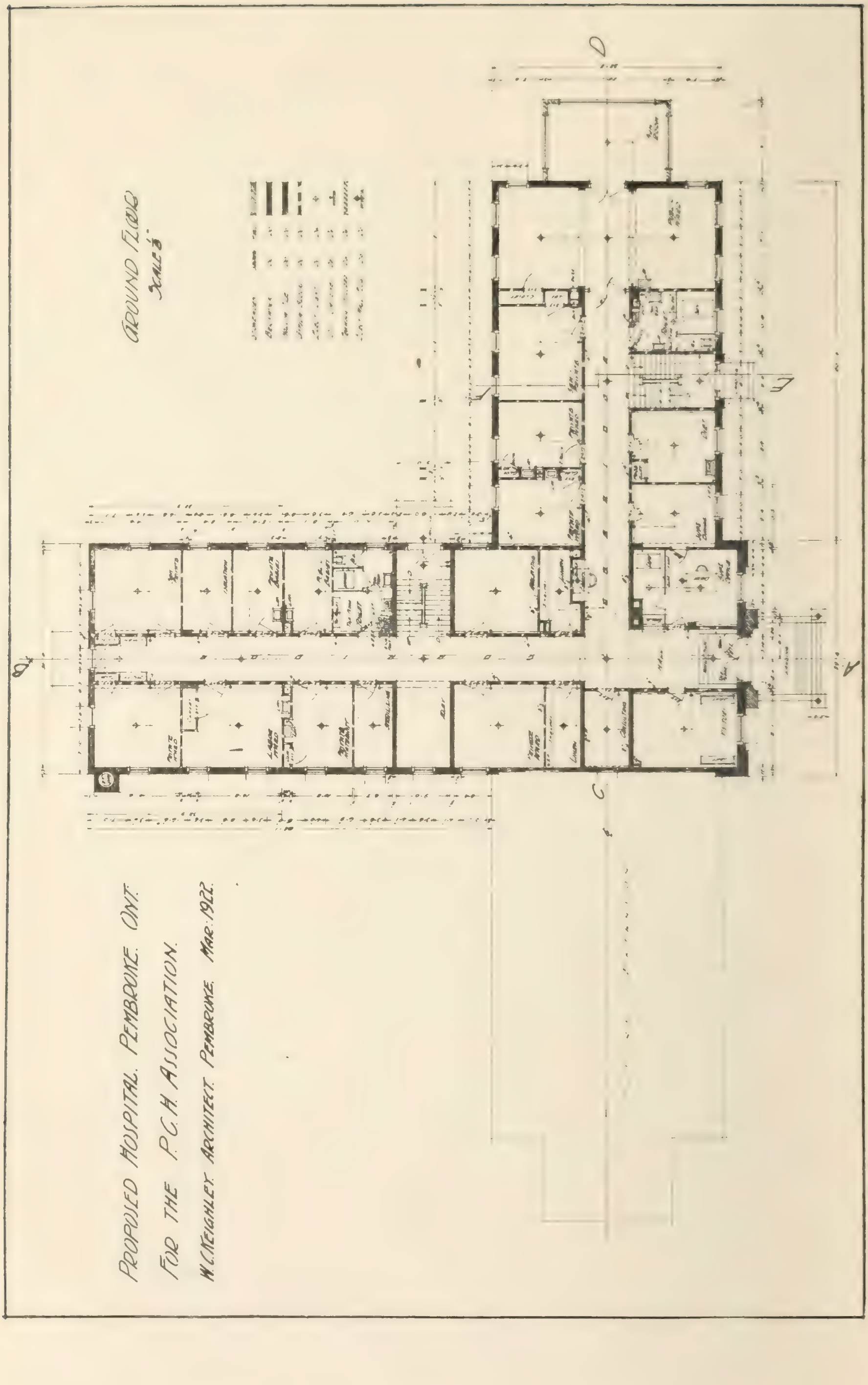

GROUND FLOOR
SCALE 1/8"
PROPOSED HOSPITAL. PEMBROKE. ONT.
FOR THE P.C.H. ASSOCIATION.
W.C.KEIGHLEY. ARCHITECT. PEMBROKE. MAR. 1922.
A
B
C
D
E

Fig. 10b.

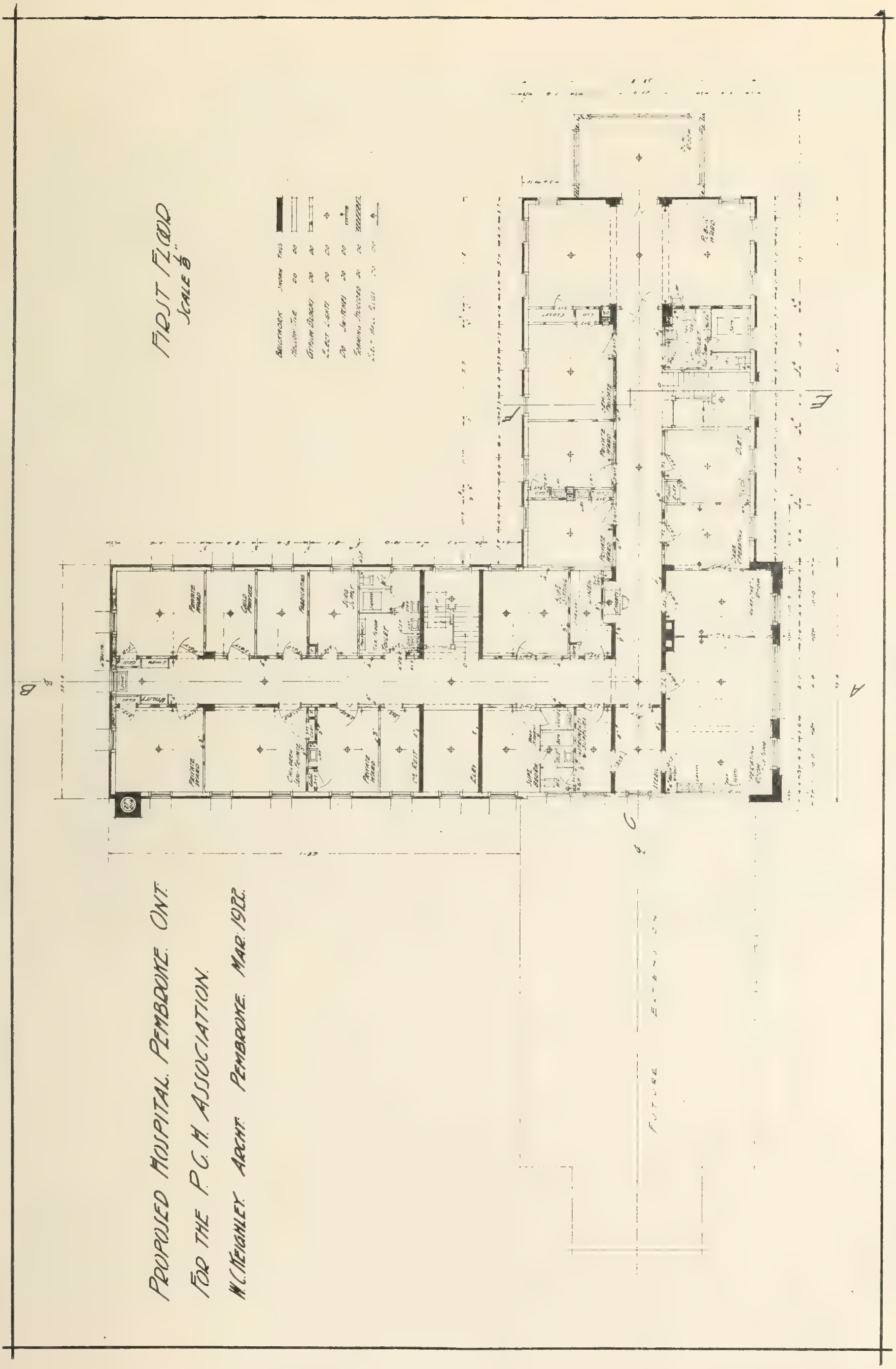

FIRST FLOOR
SCALE 1/8"
BRICKWORK SHOWN THUS
HOLLOW TILE DO DO
GYPSUM BLOCKS DO DO
ELECT LIGHTS DO DO
DO SWITCHES DO DO
FRAMING SPECCED DO DO
PRIVATE WARD
CHILD PRIVATE
SURG. SUPPLY
TOILET
CHILDREN SEMI-PRIVATE
PRIVATE WARD
NS REST
ELEV
SUPT SITTING
LINEN
CHUTE
SUPT BEDRM
INSTRUMENTS & SUPPLIES
STERIL
PRIVATE WARD
SEMI-PRIVATE
PRIVATE WARD
DIET
FOOD PREP
X-RAY OPERATING
ANAESTHETIC ROOM
OPERATING ROOM
TOILET
P.B. WARD
A
B
C
E
FUTURE EXTENSION
PROPOSED HOSPITAL. PEMBROKE. ONT.
FOR THE P.C.H. ASSOCIATION.
W.C. KEIGHLEY. ARCHT. PEMBROKE. MAR. 1922.

Fig. 10c.

Sterilizing equipment from the old hospital was used. X-ray equipment was donated by the Alexandra Club of Pembroke. Installation cost of these two equipments is included in the above total cost.

Basement walls are concrete faced with local limestone. Front entrance and other stone trim is Indiana limestone. Exterior walls are of interlocking tile faced with brick. Partition walls are of gypsum blocks. Floors and ceiling slabs are reinforced concrete on concrete beams. Roof is asbestos built-up roofing. Front vestibule steps are pink Tennessee marble. Bathrooms, operating room anaesthetic room, and dark operating room have tiled floors and walls. The whole of the floors except as above are finished with mastic flooring composition. Doors (interior) are veneered birch slab doors. Toilet partitions are of steel. The building is steam heated, low-pressure system. A garbage burner coupled to a large boiler supplies ample hot water to all fixtures. Steam for sterilizing is supplied from boiler separate from the heating plant. Water booster system is installed to keep pressure of water service steady.

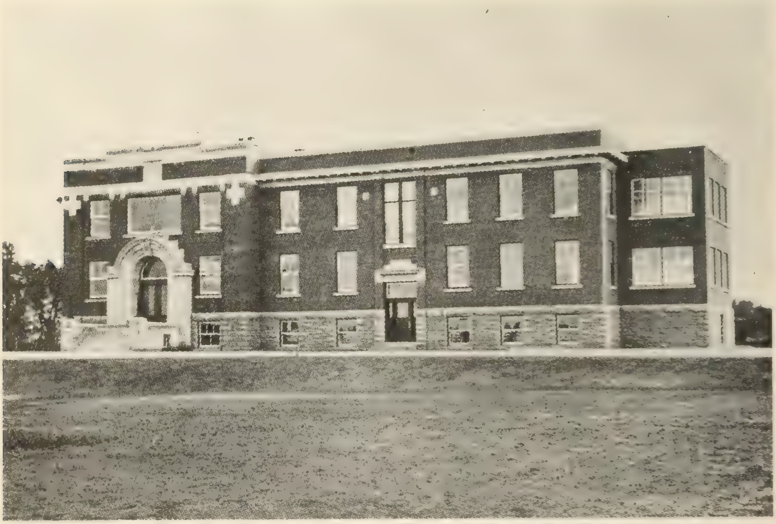


Fig. 10d—Pembroke Cottage Hospital, Pembroke, Ont.

THE SELECTION OF SITES

The decision upon the location and site of a new hospital should be approached without prejudice.

Many conditions may prevail tending to warp the judgment of those responsible and thereby making a decision on grounds of

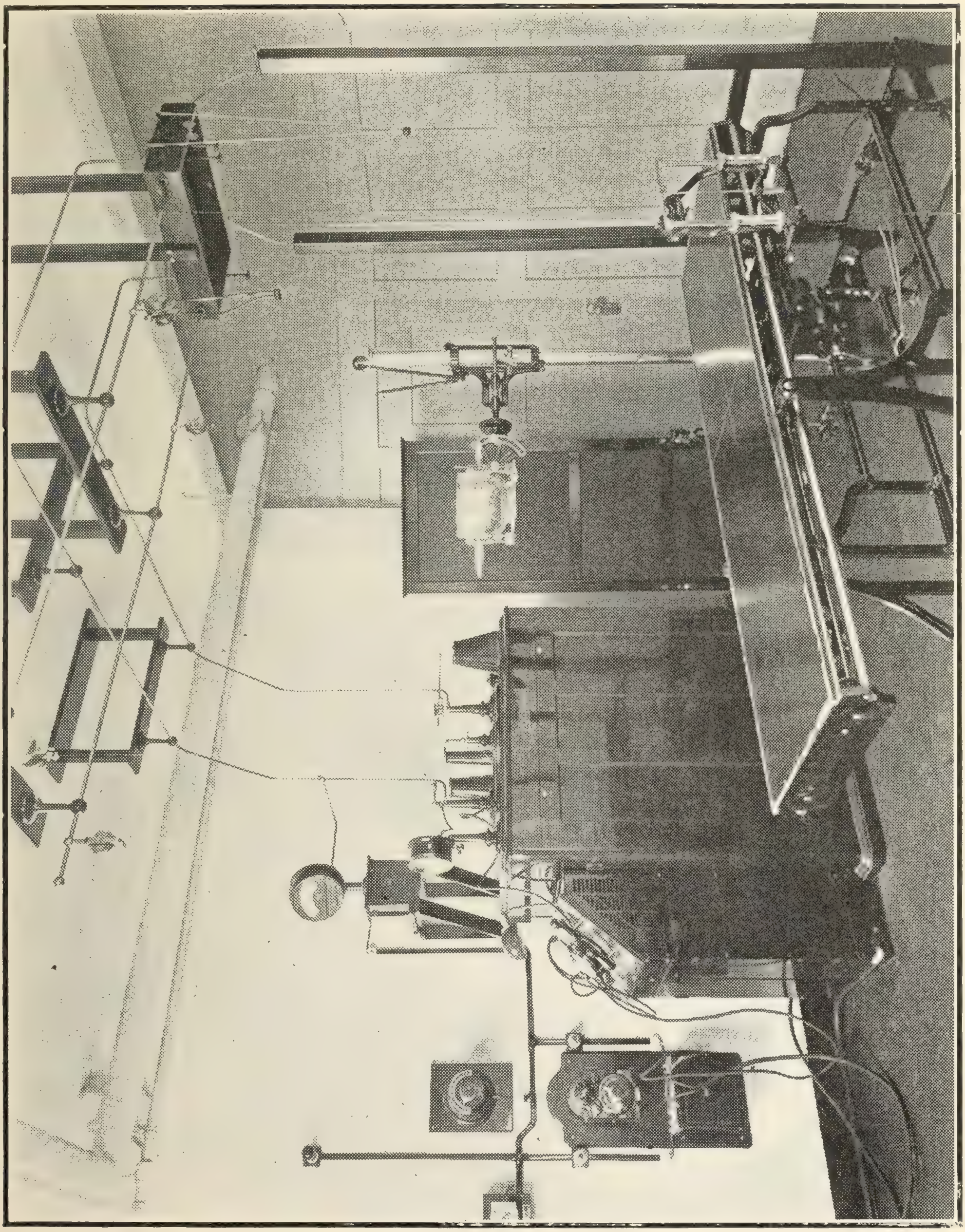


Fig. 10a—Pembroke Cottage Hospital, X-Ray Room.

expediency or fancied economy, proving in the end both unsound and preventing future growth and necessary expansion. A lapse of time very often occurs between the selection of a site and to that when the architect is called into consultation, and more often than not the architect has no voice in this all-important matter.

Unfortunately, trustees are not inclined to think this an important matter, but by observation throughout the Dominion one is constrained to pause and question whether in the choice of many ill-advised sites, usually given gratis, the architect had been consulted a better selection of locations might have been achieved. The architect's problem, therefore, in consultation with the medical advisers and building committees is to analyze and study the conditions as he finds them.

Notwithstanding that the building committee of a proposed hospital may believe that the institution they propose to build will serve the community and fill all of the requirements that the science of medicine may require for many years, it is obvious that it would be unwise to build without first preparing a rough study of the ultimate possibilities of the entire site, or of land which it may seem reasonably possible to acquire in the future, adjacent to the site.

Physicians' time is limited and the range of their activities is controlled by physical conditions. It is true that the motor car and ambulance have widened the areas within which the practitioner of medical and surgical aid can act. But notwithstanding they should be able to reach patients with the least possible expenditure of time and energy. Therefore, in the choice of a site one must consider not only the location ideal from the point of view of the patient but to accessibility for patient, doctor, nurse, and service, usually resulting in somewhat of a compromise for all the factors in the case. Physical surroundings of the site should be considered—whether the vehicular traffic passes near enough to annoy, also the possibilities of the proximity of factories and garages.

Oftentimes it has been noted that a site has been chosen in a partly residential district and in less than a generation the character of the community changed so completely necessitating the abandonment of the institution. On the other hand, suburban sites more often than not improve rather than deteriorate, and the rural site is susceptible of improvement by purchase of adjoining properties at a small expenditure. This would indicate the wisdom of securing either an ample area at the inception of the project or location where future expansion can be secured without prohibitive costs.

The orientation of the buildings is an interesting study and physicians and scientists are convinced that the sun's rays and open air has a healing effect in no small measure. It would seem, therefore, most desirable that these helpful agents should be brought to every patient in as full a measure as possible. The ideal hospital should be so planned that every room would have a full sun bath all day long. This not being possible, it should be the aim to so locate the hospital that under certain conditions and at certain seasons every side shall have the sun for a portion of the day. When the building goes beyond the simplest rectangle in plan with an east and west axis, a distinct study is obligatory. The best results in Canada have proved to be by arranging the rooms with a southern aspect and average results by rooms having either a southwest or southeast aspect.

PART II

Planning the Hospital

The preliminary survey completed, the site determined, and the class of patients scheduled under the different headings hereinbefore recommended, the problem that confronts the hospital management is that of the details of planning the various units and the relation and correlation of these general units into a complete hospital functioning with the least friction for the care of the patients. The hospital of the last century very often accepted patients having any ailment or requiring any medical or surgical service. To-day community hospitals do not undertake to treat insane, contagious or tubercular patients, although in some cases they are equipped to care for a limited number of persons suffering from those ailments.

Community hospitals should furnish medical and surgical service for adults, as well as children. The majority, it is noted with regret, are not equipped or have very limited accommodations for giving service for the many ailments of childhood.

As the industrial engineer when designing a new plant studies the product, the totals of costs and receipts, to determine the profits in the several divisions, and with the owner decides those which are likely to increase in the future and at what rate, so should the building committee study their problem.

The Modern Hospital Publishing Company, Inc., Chicago, U.S.A., in 1922 held a competition open to architects throughout the world for a small hospital of thirty- to forty-bed capacity, and in the conditions the following requirements were specified.

SCHEDULE OF REQUIREMENTS FOR HOSPITAL OF THIRTY- TO FORTY-BED CAPACITY

Rooms and Wards

Private and semi-private rooms (single and double rooms), some with private baths and water closets, six to twenty beds.

Women's ward, four, five or six beds.

Men's ward, four, five or six beds.

Maternity ward, one or two two-bed or one four-bed.

Children's ward, one four-bed.

At least two one-bedrooms accessible to the wards for recovery and segregation.

The mandatory minima of area per bed in wards for adult patients to be at least 80 square feet and not less than 60 square feet per bed in the children's ward.

Services

Separate services for private and ward patients with at least one complement on each floor designed for use of patients.

Charting space.

Medicine closet and sink.

Pantry, 130 to 160 square feet.

Utility room not less than 120 square feet.

Linen closets not less than 50 square feet, or linen room not less than 100 square feet.

Janitor's closet.

Supply closet.

Verandahs

Three separate verandah spaces—for ward patients, private patients, and children.

Operating Department

Operating room, not less than 15 feet square.

Sterilizing room, 180 square feet.

Doctors' scrub-up room, 65 square feet. (This room may be combined with doctors' dressing room.)

Doctors' dressing room with lockers and toilet, 100 square feet.

Nurses' dressing room with lockers and toilet, 100 square feet.

Nurses' workroom, 180 square feet.

Anæsthesia room, 100 square feet.

Minor operating room planned to serve as an emergency or delivery room; suitable also for dental, eye, nose and throat, and for systoscopic work, not less than 14 feet wide by 15 feet long.

Accident receiving and surgical dressing room.

Delivery room, not less than 14 feet wide by 15 feet long

Nursery, 180 square feet.

X-ray room, 225 square feet.

Dark room.

Small dressing room.

Plate storage room.

Clinical laboratory, 225 square feet.

In General

Pharmacy or drug room, 150 square feet.

Outpatients' waiting room.

Outpatients' treatment room.

Clinical record room. (This may be combined with office or visiting doctor's consultation room.)

Office.

Reception room.

Visiting doctors' consultation room, 150 square feet.

Locker and dressing room with bath for graduate nurse, 150 square feet

Kitchen, including facilities for the preservation of special diets.

Cold storage room.

Storage for groceries.

Officers' dining room.

Nurses' dining room.

Helps' dining room.

Resident physician's bedroom and bath, 120 square feet.
Superintendent's bedroom and bath.
Two bedrooms for male help with bathroom.
Two bedrooms for female help with bathroom.
Laundry.
Clean linen room.
Boiler room and coal bin.
Storage room for miscellaneous supplies.
Lavatories and toilets, as required.
The buildings to be planned to admit of expansion.
Nursing staff to be accommodated outside of the hospital.
Contagious diseases to be treated in a small isolation cottage.
Provision to be made for elevators, stairs, dumb waiters, soiled linen chute, etc.

The successful designs of the competition were published in a brochure by the Modern Hospital Publishing Company, Inc., Chicago, U.S.A., 1923.

Since the sick patient is the pivotal point of the project, the patients' quarters should have the first consideration and since the patient, the greater part of his time, is confined to bed the ward unit may be dealt with first, together with the relation of the patient's room to the utilities and amenities, as also the shape and character of the room.

Fundamentally every hospital should furnish service to any citizen who applies, no matter of what social status. But as patients' means are not alike it cannot be expected that the poor should pay the same charge as the rich. The service in most hospitals is practically the same although rich patients are generally given better accommodations, for which they are perfectly willing to pay, the charges made being such as to leave a margin over the actual cost of the service. Since this margin covers the loss generally sustained in the dispensation of services to poor patients who either since the indigent poor are not charged for services, or in other cases a charge below actual cost is made, it would appear to be a reasonable measure for hospital trustees to provide wards, notwithstanding private room accommodation.

Wards.—The rectangular or long ward with a row of beds running along either wall can be accepted as the most common form and one which will of necessity be used where economy of space is considered, inasmuch as this form of ward lends itself to the surveillance of one person for the entire group of patients in their particular ward. There are, however, disadvantages to be considered notably in its lack of flexibility since it cannot be readily converted to any other purpose. The square ward in vogue at the Rigs Hospital in Copenhagen is a type worthy of consideration. By the introduction of screens a room 41 feet by 40 feet can be divided into four alcoves, each of which has a capacity of four beds, thus providing a sixteen-bed ward, as shown in Figure 13.

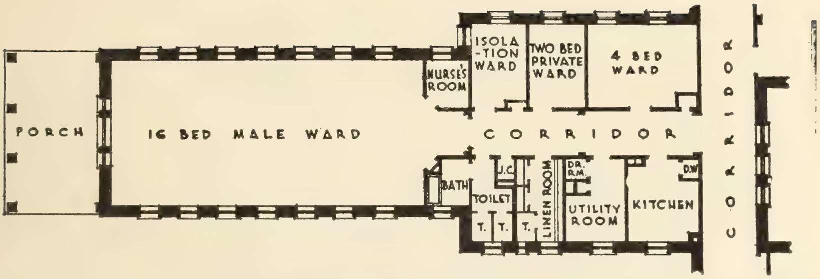
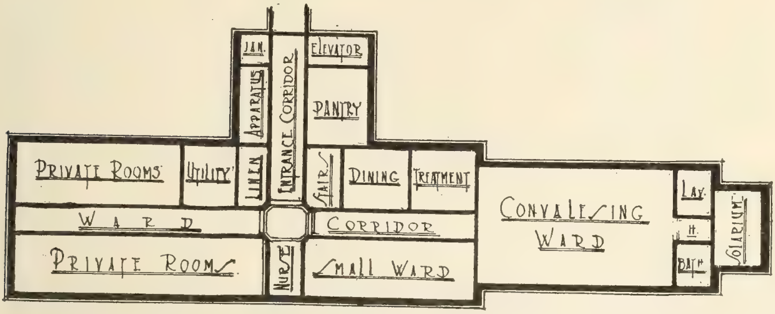


Fig. 11—A ward pavilion.



"T" SHAPED WARD UNIT

Fig. 12

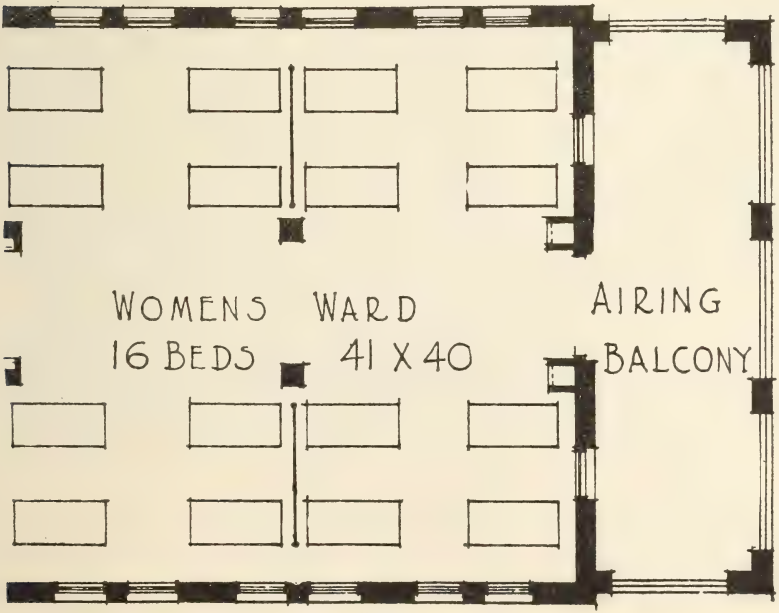


Fig. 13.

If the dimensions are increased in length it may be made into a twenty-four bed ward, as shown in Figure 14.

The sub-dividing screens should be sufficiently rigid to support the bed-side lights and the nurses' call. The top and bottom being left open to permit of a complete circulation of air. Two advantages may be emphasized in this form of ward, namely, no patient faces the light and only four patients are in one group.

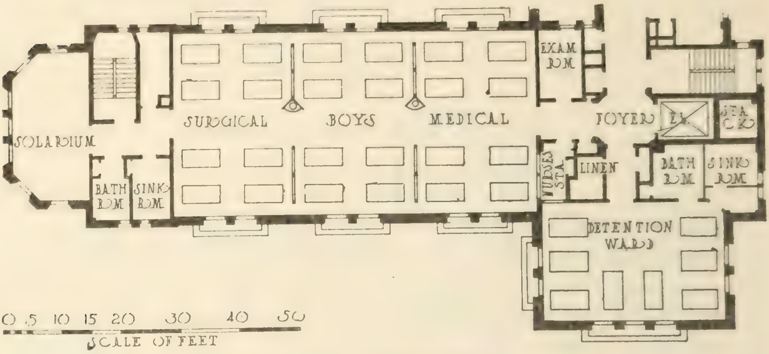


Fig. 14—Alcove ward.

In some layouts provision is made for six or eight bed wards with a subsink or service room placed at its centre, thus dividing the ward in two. A sterilizer, bowl and a water closet with a special bed pan emptying device are fitted in this subsink room, thereby considerably minimizing the distance to be covered by the attendant nurse. To further augment privacy in giving each patient almost a private room a permanent screen extending from the wall at the head to the foot of the bed and of a height of about 7 feet from the floor is used. Such screen is capable of being built in various forms of construction. One of the most satisfactory, and probably cheapest in the long run, would be that of two-inch gypsum plaster walls. These screens may be fitted with doors about 2 feet square so that when open greater flexibility, combined with opportunity for sociability, may be enjoyed by two patients in adjoining beds being able to converse as well as if the screen was not there.

The two-bed or what is generally called the semi-private room will always be popular.

Lighting.—No ceiling fixtures should be used in wards or private rooms. It is difficult for a patient lying on his back to avoid the light from a ceiling fixture. Side fixtures are preferable. At each bed should be a light plug for reading and use of physicians when examining patients.

Private Rooms Versus Wards.—Ward service can undoubtedly be furnished at a lower cost than private room service, and, further, it is undeniable that the cost per bed is less for ward beds than for beds in single or private rooms.

Good service for eight or ten bed patients in a ward can be given by one nurse since all of the patients are under observation while the nurse is in the ward as also the patients can ask for and be furnished with water, utensils or other things they may require with the least loss of time. Whereas with the patients in a single-bed room the nurse will be within the sound of the voice of one patient only at a time and, consequently, cannot render the same service to as many different rooms as there may be beds in a ward. Another phase is that of closer grouping of pantries, duty rooms and other auxiliaries required for proper technique to each bed in a ward than to the same number of beds in private rooms, which phase in consequence increases the cost of services.

Private Rooms.—There is a demand in the present day for private rooms, it being claimed that the cost of building and administration of such a plan is no greater than that of the ward system.

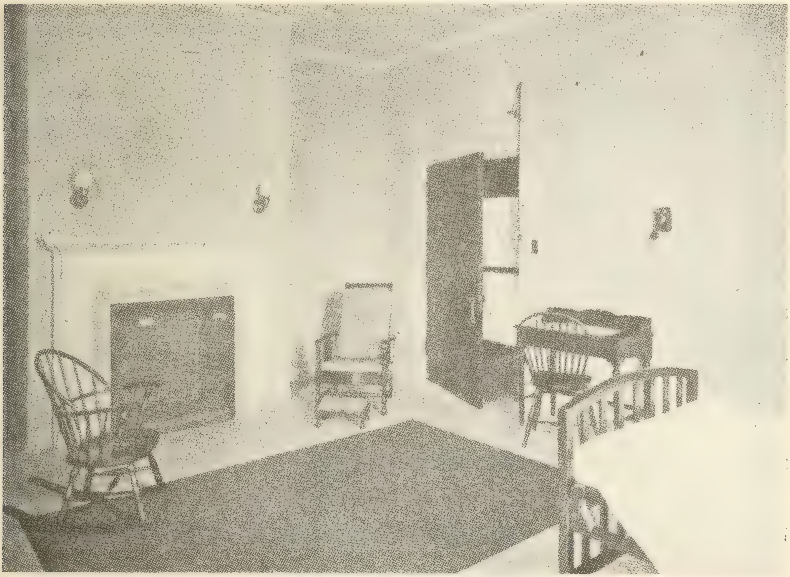


Fig. 15. A modern private room treatment.

The architect when consulted, however, makes it self-evident that when the partitions, plumbing fixtures, etc., are taken into consideration the cost of such arrangement is considerably increased over that of the ward system. Nevertheless, every hospital should have private rooms for acute cases as well as for those whose means will permit of private room expense. All private rooms as far as possible should be provided with separate toilets and wash basins, the bath being shut off from one or the other room as desired (see Fig. 16). Only a small percentage of rooms need be provided with baths, inasmuch as they are very little used by the very sick patient.

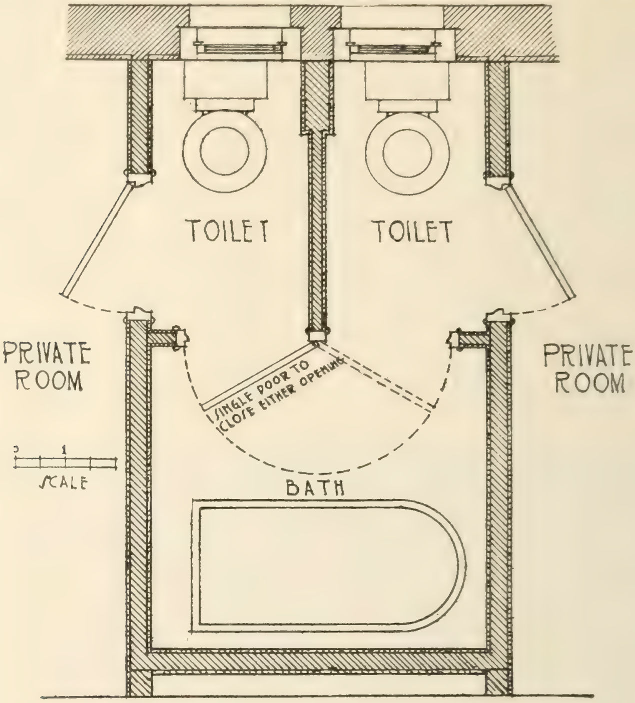


Fig. 16

Figure 17, shows an arrangement of toilets minus bath.

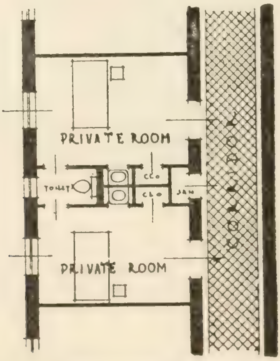


Fig. 17—Economical toilet arrangement for private rooms.

Stairs and Elevators.—The location of the stairs and the elevator, should very seriously be considered when planning the hospital, inasmuch as they are the most noisy parts of the building, and, therefore, should be cut off from corridors. Both the stairs and elevator could be economically and satisfactorily placed in one enclosure.

Patients' Clothing.—Many hospital authorities advocate that provision for patients' clothing should be made within the room in the case of semi-private and private rooms. Preferably these cupboards should be built in and arranged so that they can be well ventilated and easily cleaned. For ward patients a room should be provided, well lighted and ventilated, wherein the clothing could be properly bagged and placed in lockers. This accommodation could very conveniently be planned in the basement.

Children's Ward or Section.—The pediatric section calls for separation as from that of the general portion of the hospital, since one of the important reasons why the children's ward should be separate and distinct from other wards is on account of the prevalence of outbreak of the minor infectious diseases such as mumps, measles, scarlet fever, diptheria, etc. As is well known, these diseases manifest themselves in a children's ward either through incoming children being in the stage of incubation or active carriers of any one of these diseases, or by individuals visiting them who likewise may be carriers. In a well-planned hospital it is advisable that an observation or admitting ward be provided, whereby any of these diseases making their appearance amongst the newcomers, isolation of the

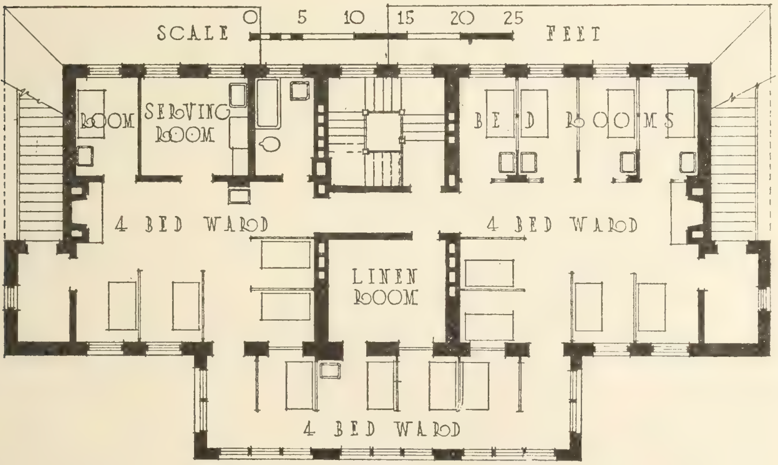


Fig. 18—Admitting department of a children's hospital.

sick can at once be accomplished with relatively little risk incurred in infecting the whole ward as under conditions where no observation ward is established. Strict asepsis being essential under such conditions, every facility should be available for the proper handling of the patients, to wit, basins with hot and cold water supplies fitted with faucets of elbow, knee or foot action type; provision for opening of doors without the hand coming in contact with same; sterilizers for bed pans, and again sterilizers for dishes, etc., etc., covering every provision which would be found in a modern hospital wherein communicable diseases are treated.

Since children do not have the same objection as does the adult of being " herded," there would appear to be no reason why children should not be placed in an open ward. In fact, medical men are agreed upon this point that the child is not only happier, but its recovery facilitated if he is placed with other children. However, a children's ward should never be planned unduly large, owing to the noise and confusion which may ensue. The sunny and cheerful day or playroom in connection with the children's accommodation should not be overlooked, inasmuch as during convalescence the child patient being provided with toys, blackboard and kiddie-car, is quite content and does not annoy the very sick children. Airing balconies are a necessity and out-of-door playrooms where climatic conditions permit.

Isolation.—No community hospital is complete unless provision is made for the isolation of infection, which may develop from time to time, as is the case in the best of regulated hospitals. If two rooms in a thirty-bed hospital are provided and supplied with adequate facilities for proper care of patients without having to use any other section of the hospital, excepting for food supplies, they would be sufficient for such hospitalization.

Each room should be supplied with hot and cold water, the basins being fitted with faucets of forearm, knee or foot action to avoid contact by hand.

The furniture in these isolation wards should consist of one metal bedstead, white enamel chair, wire basket (for swabs, etc.), white enamel bedside table fitted with shelves to take one bed pan, one urinal, one metal wash bowl and one metal cup, soiled linen canvas basket, three hooks for gowns of doctor, nurse and maid, and one thermometer with metal holder affixed to the wall adjacent to the bedside.

Delirious and Moribund Wards.—In addition to the accommodation for isolation of infectious diseases two rooms should be provided in a thirty-bed hospital for delirious and moribund cases it being obvious that such cases are detrimental to the recovery of the patients in the same ward.

Maternity Department.—The delivery and labour rooms should be separated from the other wards and private rooms of patients, and special provision made for sound-proofing the separating floors, partitions and doors. In the delivery room the wash-up for the obstetrician may be placed, as also an instrument sterilizer, pack sink and disposal sink. Closets and cupboards for supplies should be ample

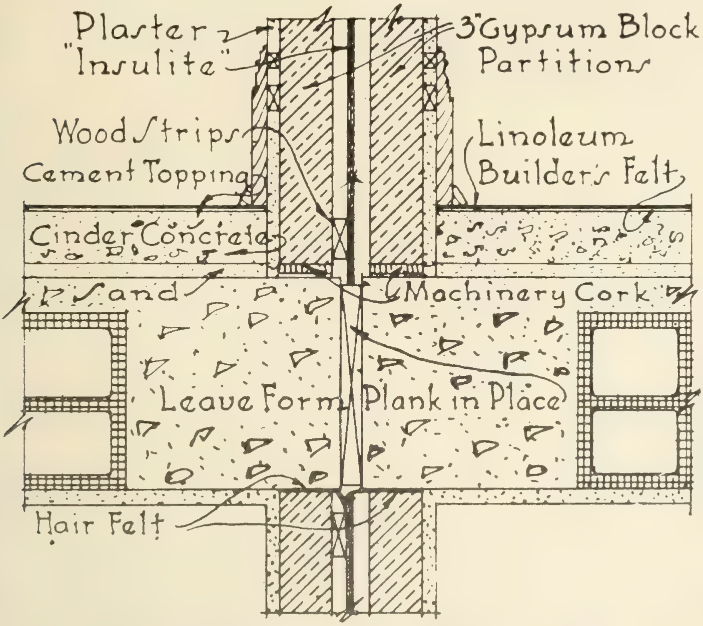


Fig. 19—Detail showing floor and partition construction.

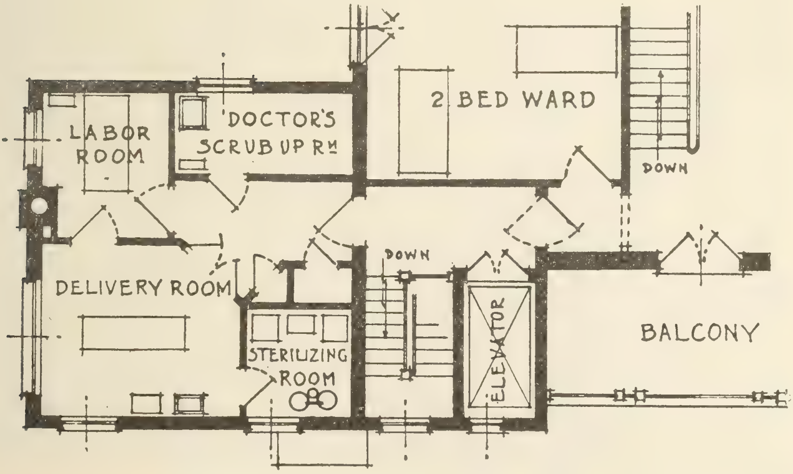


Fig. 20—Delivery section of maternity hospital.

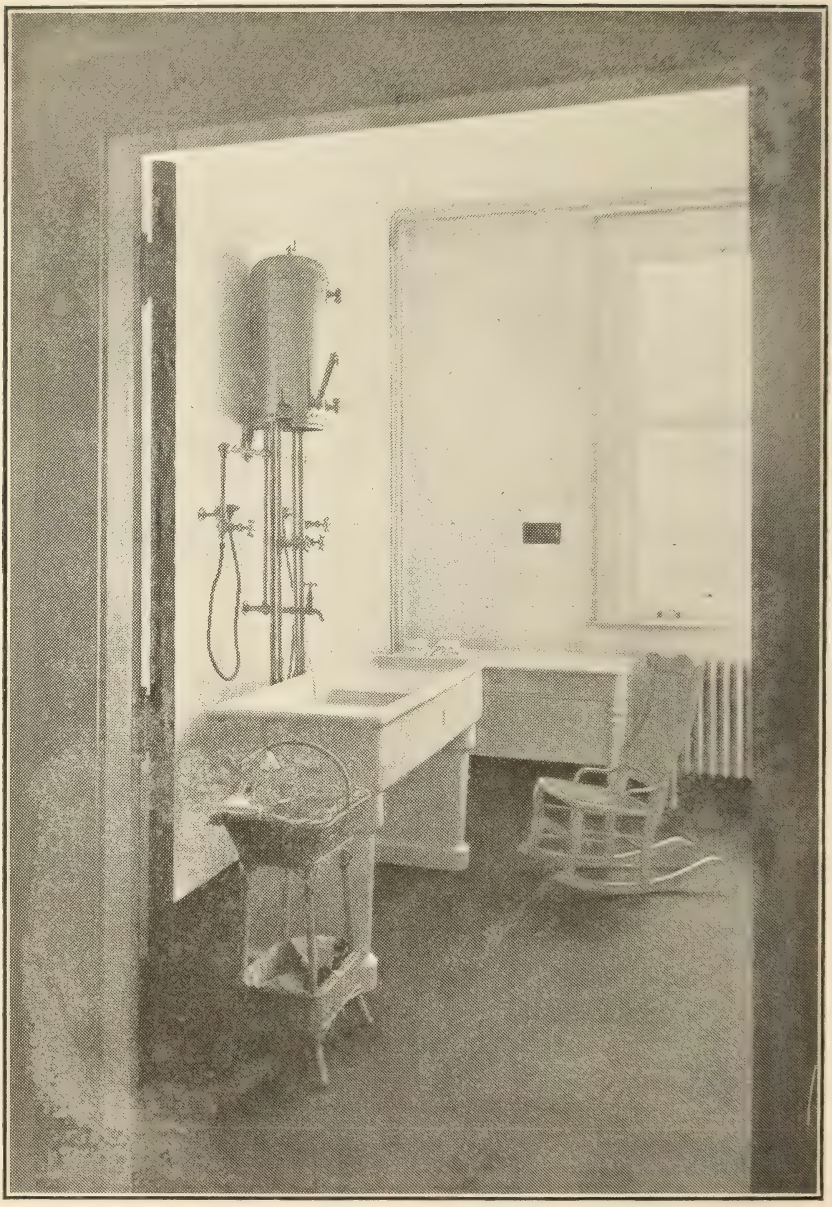


Fig. 21—Baby bathroom, Pembroke Cottage hospital.

In many hospitals it is to be noted that a creche or baby room is provided wherein should be fixed a special infants' wash sink with gravity flow of water, automatically tempered (see Figure 21), a compartment case with a division for each infant's supplies and shelf for the cribs.

Solaria.—Sun and air are very important therapeutic agents. No hospital should be without them. Solaria as well as open-air balconies should be provided. Patients either in a ward or private room need a change, and the solarium or open-air balcony affords a place of diversion and assembly. The continuous balcony is not desirable or necessary. In practice it has proved to be unsatisfactory, except in the cases where infectious diseases are dealt with, when they are used for the purpose of visiting patients without coming in direct contact with them. If in the development of the project it is found that a solarium only can be provided, then it should have windows which when open will give open-air conditions. If it is possible to have both the solarium and an open-air balcony, so much the better. It has been the experience of hospital superintendents that the majority of patients prefer the open-air balcony. A solarium at times may be overcrowded by patients, therefore ample ventilation should be provided, and, further, since it would be used equally as much during the winter months, it should be adequately heated.

Outpatients' Department.—Many doctors in rural communities may question the advisability of including in the planning of their hospitals accommodation for an outpatients' department. But, nevertheless, it is conceded that such accommodation is a most important and ever-growing feature of hospital work. Therefore, such provision, it is considered, should be made for this important phase of hospitalization. This department should be so planned that when a patient is received therein the routing of the patient may be accomplished with the least possible confusion. Under no circumstances should it be necessary for the patient to pass through the waiting room in going from one room to another; and, further, the outgoing patients should be entirely segregated and not allowed to mingle with the incoming patients. In many parts of the Dominion these outpatient departments have proved to be a boon for evening clinics, notably for veneral diseases, etc. (see Figs. 22 and 23).

Nurses' Station.—This question has often been discussed and many decisions have been arrived at, but in the final analysis the opinions expressed by hospital superintendents indicate that the ideal location for the nurse on duty is that of the corridor centrally placed in an enclosed section with observation windows giving lookout up

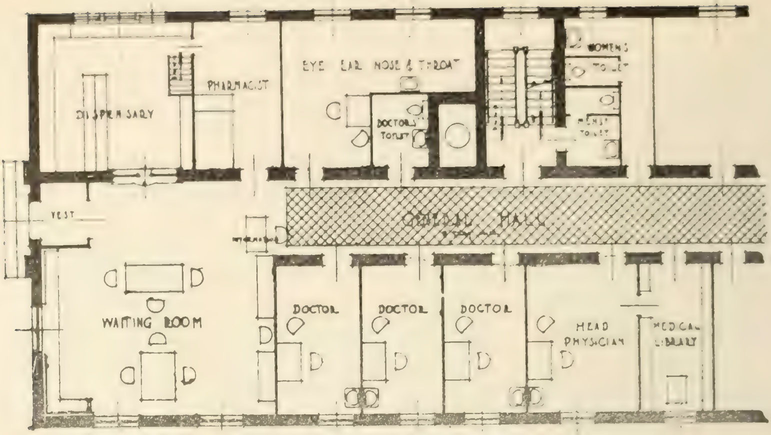


Fig. 22—Out-patients' department.

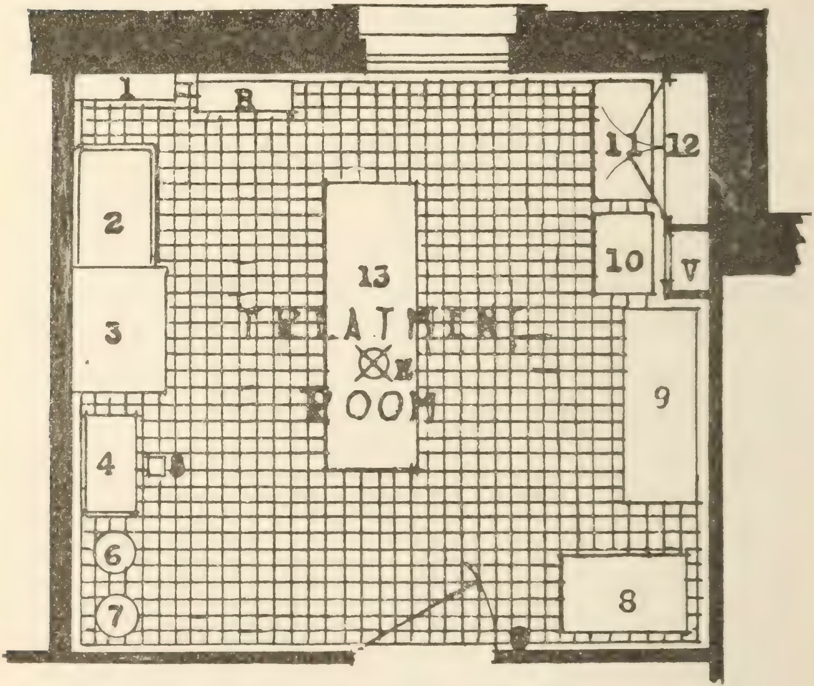


Fig. 23—Equipment of treatment room.

1. Marble shelf.
2. Surgeon's sink.
3. Drain board.
4. Instrument sterilizer.
5. Floor drain.
6. Cold sterile water.
7. Hot sterile water.
8. Dressing carriage.
9. Shelf stand.
10. Instrument table.
11. Dressing table.
12. Instrument case.
13. Examination table.

E. Electric.
R. Radiator.
S. Switch.
V. Vent.

and down the corridors. If exception is taken to the enclosed section the nurse could be placed in the open corridor, which would give her an unobstructed view of the entrance to the rooms and utilities. Wherever this station is, at that point should be concentrated the annunciator for the patients' call for the nurse, the telephone and the medicine cupboard. It is advisable to provide a linen room preferably at the rear of same, which room should be fitted with shelves for linen, trays, and other accessories.

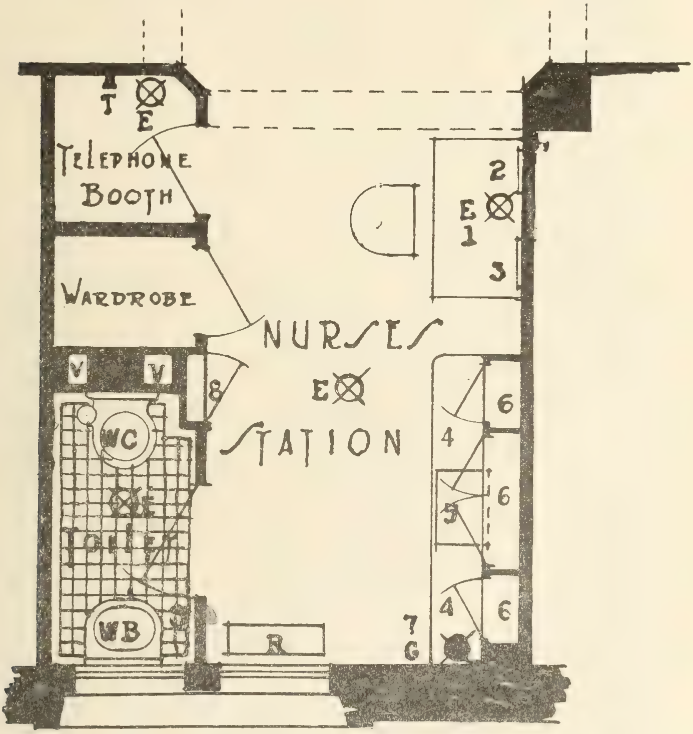


Fig. 24—Equipment of Nurses' Station.

1. Desk
2. Annunciator.
3. Bulletin board
4. Case
5. Sink
6. Medicine cabinet
7. Gas plate
8. Panel board

E. Electric
G. Gas
R. Radiator
S. Switch
T. Telephone
V. Vent

X-ray Treatment.—Provision must be made for giving X-ray and radium treatments, and the time may come when it will be necessary to provide equipment for others, such as oxygen or ozone, or pneumatic chambers for all of the forms of light treatment, such as ultra-violet and Finsen, brine, radioactive earth and balsam baths, many of which are used extensively in Europe and in private rest cures and sanitaria on this Continent for the benefit of the wealthy, but which are beyond the reach of the poor.

Figure 27 under section relating to operating service room, page 48 shows a suitable location and arrangement for X-ray room.

Utilities.—The services in connection with the patient should now be considered. It is essential that certain service rooms should be located in close proximity to the accommodation for patients, to wit, diet or serving room, sink or duty room, pharmacy, toilets and baths, also house maids' sink closet, etc.

The diet or serving room is more fully dealt with under the section relating to food services, but en passant it may be well to state that since the method of serving food to the patient is one that is undergoing many changes, it is impossible to lay down any definite rules which may become a standard for all hospitals. The method of carrying food in insulated carriers or thermos containers and the possibility of serving the patients direct from the waggon makes the use of the serving room of less importance. Whatever the method of serving may be, occasions will always arise when some food or drink must be prepared. Therefore facilities must be available (see Fig. 25).

The fixtures for cooking and serving hot food, consisting of gas stove (11) and steam table (12) are placed together under a vented hood (14) in front of which the wall is furred from the ceiling to eliminate cleaning and painting of the upper surface of hood. The under surface of this hood is lined with glazed tile continued up from rear wall; this makes a sanitary surface easily cleaned. The steam table (12) provided with openings for heating aluminum inserts and pans containing hot food sent from kitchen should have: (a) Front nine-inch serving board. (b) Nine-inch splashback. (c) Steam valves and coils for separately heating bain-marie pan above and dish warmer below, so that dishes may be heated without overcooking the food; painting valves distinguishing colors, e.g. steam valves white, water valves green and drain valves yellow, prevents maids from operating the wrong valve through ignorance. (d) Spring hinged drop doors for the dish warmer which close when not in use. The sliding door is worthless, since it is always left open.

The gas stove (11) with four burners and upper oven is essential for cooking "specials" and for night use.

A five-gallon hot water urn, steam heated, is convenient for making fresh tea. Pots containing tea balls are kept on steam heated shelves below.

Trays, set up on shelves, (6) are transferred to the tray carriage stationed beneath and, after being supplied with food, are conveyed to patients.

A mechanically operated clock (c) stimulates prompt service.

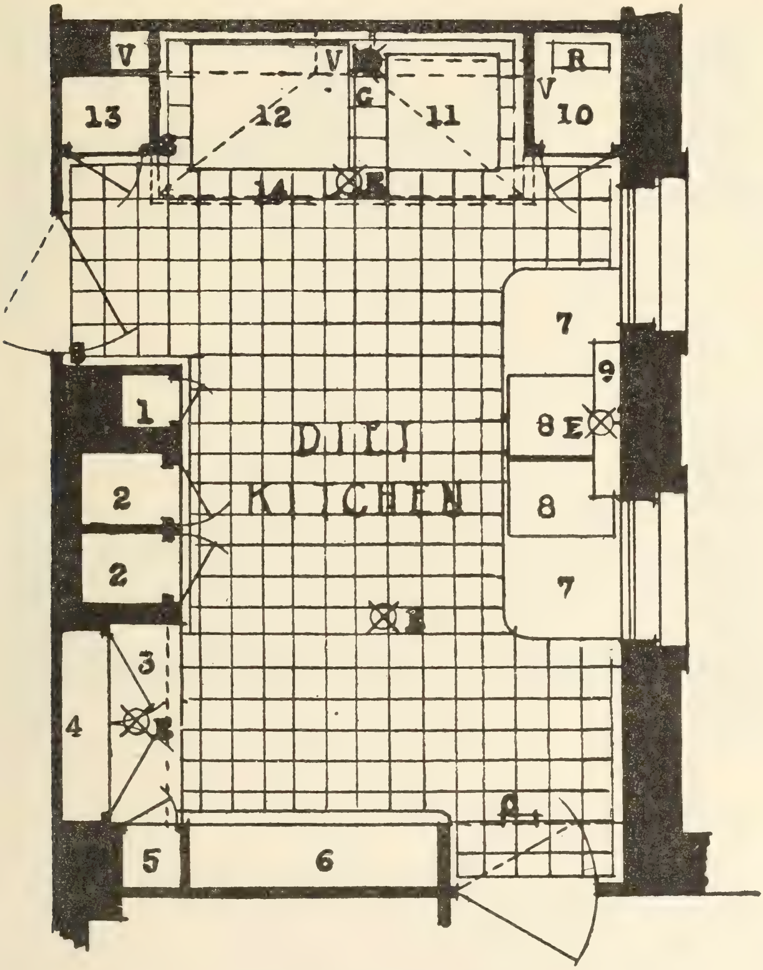


Fig. 25—Equipment of diet kitchen.

1. Locker
2. Refrigerator
3. Counter
4. Cupboard
5. Bread locker
6. Tray shelves
7. Drain boards
8. Sink
9. Marble shelf
10. Dryer
11. Gas stove
12. Steam table
13. Broom closet
14. Hood

C. Clock
E. Electric
G. Gas
R. Radiator
S. Switch
V. Vent

Utility or Sink Room.—The utility or sink room whether there are toilets directly connected with the wards and rooms or not is essential, and must be equipped with facilities for sterilizing bed pans and urinals, washing rubber blankets, making poultices and preparing disinfectants. In fact this room for all intents and purposes is the nurses' workshop (see Fig. 26). Briefly summarized the equipment should consist of a sink, laundry tray, bedpan hopper, bedpan and urinal rack, utensil sterilizer, instrument sterilizer, gas or electric point, table and waste receptacle. Further, a blanket warmer is desirable (but optional) and so located that it can be used also as a utensil warmer.

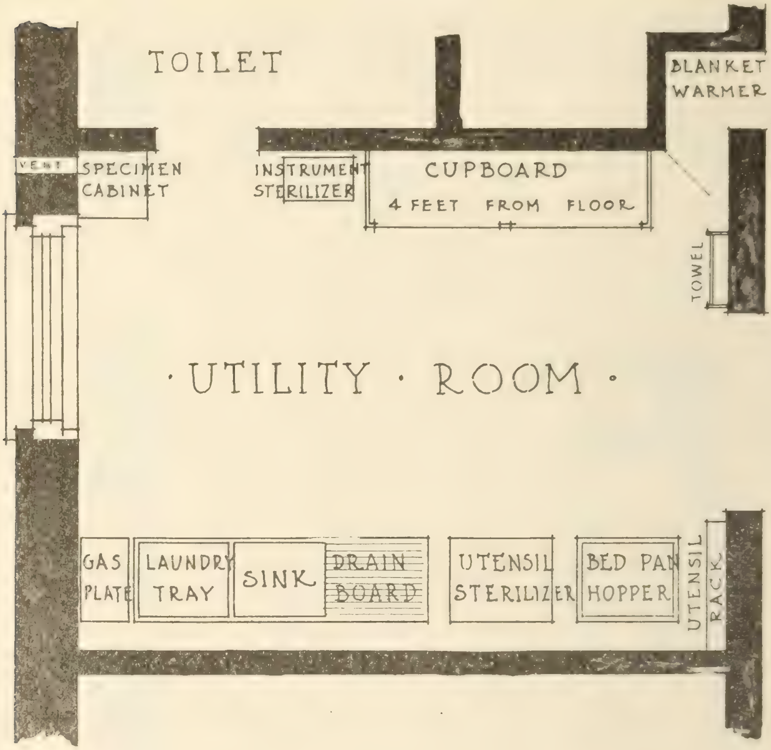


Fig. 26—Utility room showing necessary set fixtures. Blanket warmer is so located that it can be used also as a utensil warmer.

Toilets and Baths.—Toilets for open wards located either immediately adjacent or connected therewith should be provided, but in the sections of the hospital which are devoted to private room accommodation the general toilets may be omitted altogether. The bath, whether tub or shower, should be selected with reference to the easy bathing of the patient and placed high enough to permit of the greatest assistance from the nurse or attendant. The high or slab tub is used in some cases where the patients cannot be trusted to bathe themselves. With this form of fixture the attendant stands and sprays the patient with water as with a shower. The shower bath need not seriously be considered as a necessity for the use of sick patients.

Operation Service Rooms.—Professor Cabot, in speaking of the psychological effect in surgery, remarks, inter alia, that operations are a severe strain upon the fortitude of any patient, and surgeons commonly fail to make any allowance for the fear, which may amount to terror in patients, and unintentionally frequently exposing patients to unnecessary contact with the paraphernalia of surgery. He strongly deprecates the practice of bringing a patient to the operating room conscious and that the common practice of the patient being met with a parade of gowned and bemuzzled nurses, assistants and surgeons, is prejudicial to the welfare of the patient.

Therefore it would seem to suggest that an anaesthesia room separate from the operating theatre is an essential, unless the anaesthetic is applied in the ward or private room prior to proceeding to the operating room, which is not good practice.

Hospital boards are often perplexed as to where the operating room should be placed, but no hard and fast rule can be made. The top floor, however, is most desirable as it is away from the general traffic of the hospital and offers better opportunity for direct exterior lighting.

The minimum operating service is one operation room for general operations, which room need be no larger than sixteen by twenty feet, or have more than from three hundred to three hundred and fifty square feet. Anything in excess, excepting for observation, is wasted room. In a service of these dimensions the surgeon's dressing room and room used co-jointly for sterilizing and nurses' work would complete the unit.

Certain fixtures for washing instruments and for disposal of waste materials should be in a room or space separate from the sterilizing and nurses' workroom. In this latter room, space should be provided for making up surgical dressings, cleaning of instruments, scrub-up provision for the nurses, sink used in preparing saline solutions, ample cupboards or cases in which to place material to be sterilized and which has been sterilized, it being looked upon as the general workroom of the unit.

For sterilization purposes a water sterilizer, dressing sterilizer, and one or more instrument sterilizers, with one or more tables, should be provided. Adjacent should be a blanket warmer, which may also be used as a saline closet.

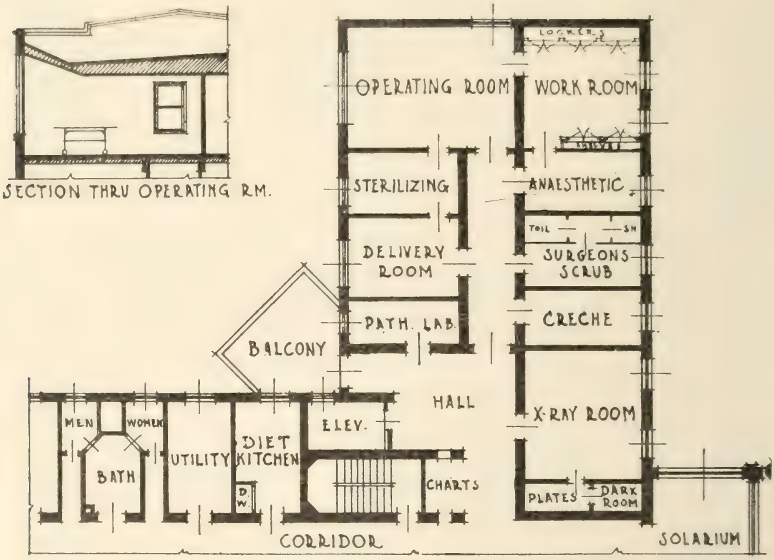


Fig. 27—Operating suite and service arrangement.

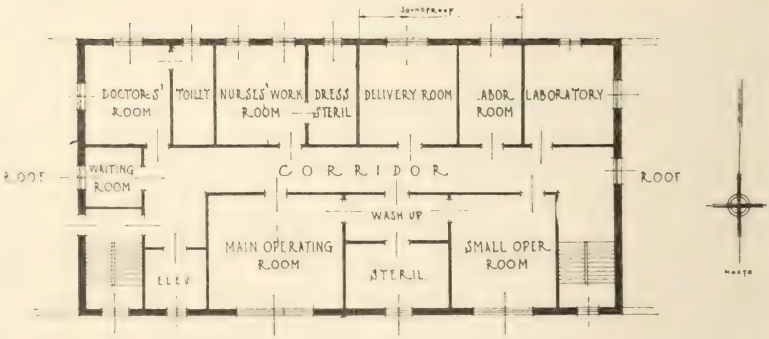


Fig. 28—Upper storey of operating suite.

A most important point to be considered in the planning of the operating suite is that it should be so located that visitors or employees do not pass by the rooms (see Figs. 27 and 28).

The operating suite as herein outlined may be increased as necessity dictates, but not necessarily by the number of patients in the institution but rather in the number of surgeons who wish to operate at the same time. The most important item in operating room construction is the lighting. A direct north light is desirable, a vertical window extending far enough above the normal height of the ceiling to give a direct light on to the operating table has been found to give the best results and is largely replacing the skylight. Where and when artificial lighting is necessary, a diffused light is preferable which can be obtained by the placement of four, or six, or more semi-reflecting ceiling lights suspended at a convenient height on either side of the operating table, *but not directly over the table*. It is considered an economic necessity to provide a small room for plaster work, which room should be fitted with a sink and slate slab. The equipment for water sterilizing necessary for the services could be either in the form of a central plant located in the basement with tin lined pipe runs to a re-heater, or as independent units in the operating suite and elsewhere as required.

The initial cost is greater for the central plant arrangement than that of independent units, although the former under certain conditions may be considered the more desirable.

The scrubbing up of surgeons before operating should be arranged for in a small alcove outside the operating room.

Intercommunicating Means in Hospitals.—It should always be borne in mind that the patient is constantly being taken through the corridor and wards. Not as he would walk through a hotel, but on a stretcher or more likely on a hospital bed. Therefore the width of the corridors must be such that a bed which is 6½ feet long and diagonally 7 feet may be turned within this corridor. The doors of all of the patients' rooms should also be of sufficient width for the beds to pass through. Most beds are at least 3 feet wide, the projections on the bed making an additional 2 or 3 inches, consequently the doors entering the wards and private rooms should be 3 feet 8 inches wide or preferably 4 feet for easy communication.

The width of doors of approach to the elevator is equally as important as the width of the corridors. The elevator cage should be of sufficient dimensions to be able to take a bed with its attendants, and the doors made wide enough for the passage of the bed.

Administration Quarters.—Since the hospital is primarily built around the patient the question of administration quarters would follow the amenities concerning the patient and his immediate welfare while he is in the hospital. A central location is the most desirable, inasmuch as enquiries are made in this section, consultations held and the general machinery of the hospital directed. Where strictest economy must be observed and maintained, it is generally found that a portion of the entrance floor of the hospital can best be utilized for this purpose. The administration unit covers bookkeeping, accounting, headquarters of the superintendent or matron, conference room for doctors or trustees of the hospital, information desk, telephone switchboard, staff rooms and the hospital library.

If the hospital chances to be a memorial building wherein the memorial feature should be emphasized, this emphasis can be made in the entrance to the administration unit by a larger and more spacious room, with space for tablets, and to the architectural features. In many hospitals the entrance is a place of great confusion and in others is to be found an air of refinement and an appearance of orderliness. (See Fig. 29.) A very satisfactory arrangement is that where a reception room at the two sides of the main entrance is planned, one for people interested in the work of the hospital, the other for visitors to patients. In addition to which a bureau of information is located convenient to both, while overlooking the doorway and interior hallway. By this means the superintendent, or clerk, as the case may be, at the bureau of information controls the situation as a whole and efficiently directs and distributes all visitors.

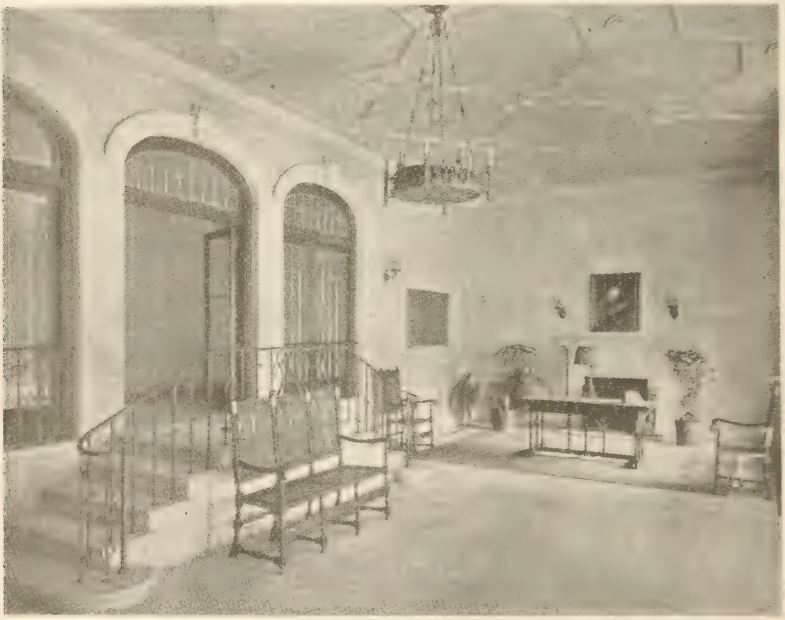


Fig. 29.—Hospital entrance lobby.

Library.—Too little thought is usually given to the provision of reading matter for the patients. In practice it is to be observed that certain hospitals have made provision for a library wherein books are taken from such library and delivered to the patient; whereas in others portable bookcases on wheels where books and magazines are arranged, and wheeled to the bedside of the patient, who is given the opportunity of making a selection. For a patient weakened by sickness the bound book, or the magazine with its large proportion of advertising matter and its stiff binding, is often too heavy to hold. This problem has been solved in some of our hospitals by making careful selections of single stories from magazines, cutting them out, and neatly enclosing them in stout covers with the name of the story, its author and the magazine from which it was taken. This system has been named the "Pass It On" library.

Food Service.—There is no department of the hospital in which results are more dependent upon intelligent study than in the dietetics department.

In the words of Dr. Frank E. Chapman, "this department has by far the largest budget of any department in the hospital and, inasmuch as the physical layout is responsible to a large extent for its efficient or inefficient performance, too much care cannot be given to the proper planning of this activity." A very common mistake made is that of planning the dietary department and then attempting to fit a service to this plan. The centralization of all preparatory services is by far the most economical and wherever it is possible the food of the personnel of the institution should be prepared and served from the main kitchen.

The preparation and serving of food in a hospital differs from that in a hotel or restaurant, chiefly in that in a hospital it is necessary to prepare for a greater variety of needs. Every gradation from the highly specialized diet to that more suitable to the needs of the fireman, who shovels tons of coals into the furnace daily, must be taken into consideration.

The problem of planning and equipping the kitchen will vary considerably with both the size of the hospital and the class of patients it cares for. The class of patients to be cared for, children or adults, will need to be considered in the selection of the equipment. The location of the kitchen is a matter of great importance and which should have reference to easy delivery of supplies, quick and easy delivery of cooked food to wards and rooms and to the staff dining rooms. It must be conveniently located for supervision with proper relation to store rooms and cold storage rooms, well lighted and ventilated to prevent the dissemination of odours of cooking throughout the hospital. (See Fig. 30.) Miserable failures through want of study of these particular questions are to be noted in the planning of some hospital buildings, in that the general kitchen is placed in some inconvenient location where proper supervision is difficult and proper lighting and ventilation almost an impossibility, by which and through other causes the meals reach the patient's bedside in a cold and unpalatable condition.

Nothing is more distasteful or prejudicial to the patients than where the odour of food permeates the whole atmosphere. The basement kitchen, wherever possible, should be avoided, the only point in its favour being possibly that of economy in the initial cost of the building. But since the basement space can be used to better advantage for other purposes, such location for the kitchen will very seldom be found sufficient to justify disregard of its disadvantages.

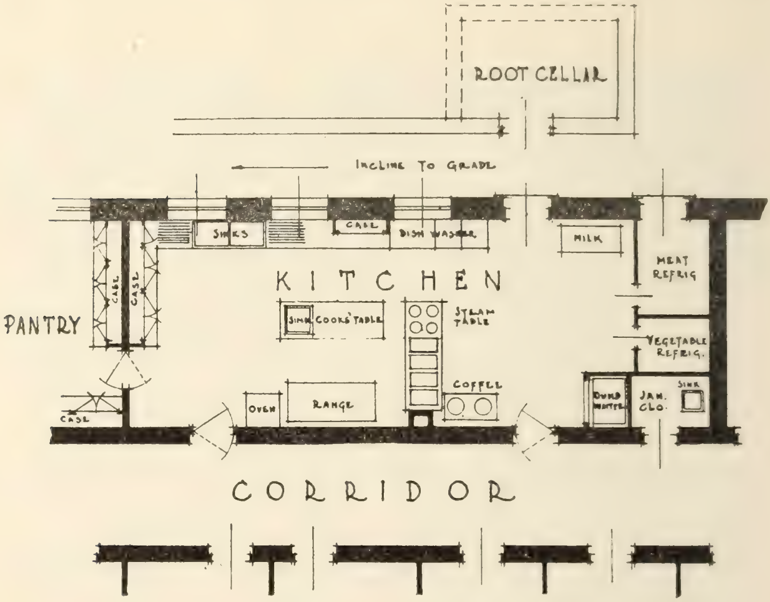


Fig. 30—Detailed kitchen layout.

There are two alternatives which may be looked upon as a solution to the choice of location, namely, either on the first floor, preferably in a wing connected with the main building, but shut off by doors, or on the top floor. (In the case of larger hospitals a kitchen unit in a separate building has been found to be the most efficacious.) Both of these locations have their advocates, since each has its own advantages and disadvantages. Accessibility would seem to favour the first floor location, in addition to which its convenience to store rooms, easy supervision and quicker delivery of food to the patients; as against which such location may make it more difficult to light and ventilate and more likely to permit of the odours of cooking escaping from time to time, and, further, the noise occasioned in the handling of utensils, thereby disturbing the patients. Advocates of the top floor location claim that the liability of the odours of cooking permeating to the patients' rooms is considerably reduced, as also the kitchen in this location can be both lighted and ventilated more satisfactorily.

It would seem in the final analysis that the disadvantages of location on the top floor outweigh the advantages, as practical experience has demonstrated that it greatly increases the labour of delivering supplies to the kitchen and returning ashes, garbage and other refuse from it. In addition to which there is considerable loss of time on the part of nurses and others of the hospital personnel, as also in transporting the patients' food from the kitchen to the wards, resulting in poorly served trays and colder food.

The size of the general kitchen depends entirely on the size of the hospital and by the work that is to be done there. While too small a general kitchen will always be regretted, it is also possible to go to the other extreme and have too large an area of unused floor space, causing unnecessary labour.

Wherever possible the kitchen should be open on three sides to ensure proper lighting and ventilation. Skylights should be avoided as they become hot from the strong sunlight and liable to cause condensation of the moist air on the cold glass and consequent dripping. The walls should be of white tile, not only for the sake of cleanliness, but for that of better lighting.

Exhaust fans properly planned will be found invaluable in extracting from the kitchen, odours and steam. If such fans can be connected with the hoods over the range, the steam table, the steam kettles and the vegetable steamer, they will be found a source of great satisfaction. The artificial lighting should be ample since the kitchen will often be used when it is dark, in the evening and in the early morning. The lighting fixtures should be so placed as to properly illuminate the room without casting shadows upon the work. Further, they should be so located as to light the range, the cook's stove, the steam table and all machines which are liable to be used when artificial light is needed. In the selection of plumbing fixtures and their installation too much care cannot be given. All fixtures should be set some distance from the wall in order to prevent harbouring of vermin in the cracks behind them and, further, the installation should be so arranged that easy access can be had to the pipes and other parts for repairing. Valves should be fixed in the supply pipes running to each individual fixture whereby the water can be shut off while repairs are being made without interfering with the rest of the building. All transverse pipes should be installed two or three feet from the floors. Where the plumbing fixtures such as sinks, etc., are not furnished with integral backs, it will be found of great advantage to cover the wall back of each such fixture with tile or other impervious material, set flush with the plaster, unless the entire room is wainscotted with such material. All plumbing should be of open type, namely, pipes exposed where they can be easily repaired. Iron pipes covered with aluminum, bronze or a good enamel of a colour to match the walls is less expensive and more satisfactory than pipes made of bronze or brass metal, which require much polishing to keep them in a presentable condition, and, incidentally, being the source of much annoyance and expense.

Wooden counters and table tops covered with sheet metal are not recommended as the metal has a tendency to buckle with the shrinkage of the wood. Therefore, steel, marble, slate or soapstone is recommended. The steel tops are especially desirable for use near the range where hot utensils are likely to be placed on them.

The best material for the kitchen floor is tile, preferably of a grey colour, the surface smooth without any suspicion of glaze and yet having enough grit to prevent it from becoming slippery. As an alternative the red quarry tile is acceptable, inasmuch as it is cheaper and has proved very satisfactory in quite a large number of hospitals throughout the Dominion. If quarry tile is used it should be set with close joints.

The walls should have all corners rounded and should be so built as to be easily cleaned and not liable to chip and scar. If the plaster is finished with a surface of Keene's cement it can be rubbed till it is almost as hard and smooth as glass and this, when finished with a good enamel, makes a cleanable and durable wall. However where possible, the entire room should be wainscotted, preferably with tile, set flush with the plaster in order that no edge may be left to collect dust. The base of this tile wainscot should have a cove where it intersects with the floor, thus obviating the collection of dust etc. in the angle of the wall and the floor.

The doors and door frames for protection from damage by trucks, etc., should be covered with metal plates extending at least to a height of 2 feet from the floor. All hardware should have a finish which does not require polishing, as also all doors to the kitchen itself and supply rooms should be equipped with locks.

The policy of having only one room for the entire kitchen activity tends to confusion and is not productive of the best results. Therefore, it is advisable to have spaces set aside for meat and vegetables, cold and dry storage.

The proper installation of the equipment is far more important than the actual equipment, inasmuch as a most efficient piece of equipment may lose its entire value if placed relatively in the wrong position. The whole operation performed in the kitchen should be studied with institutional performance in mind and the unit laid out to permit of such performance in the easiest manner possible.

Hotel installation is not a good example to follow, since the service required of a hotel kitchen differs entirely from that required of a hospital kitchen.

For the conservation of labour, and, therefore efficiency in the administration of the food service as many labour-saving devices as possible should be installed. Cupboards and shelves should be supplied in plenty and above all easy of access. The question of open shelves or closed cupboards can be decided by those immediately interested in the institution.

The place and manner of washing patients' food dishes is another function which must be determined. They may be sterilized in each food service room or transferred from and returned to the main kitchen and there sterilized by a mechanical dishwasher. Experience has proved the value of sterilizing dishes used by patients by the decrease in cross infection where such process is carried out; therefore all patients' food dishes should be sterilized in the food service room, which is located on the same floor as the ward or private rooms, thus avoiding any possible contamination in the main kitchen

It is the practice in many hospitals for the nurses to prepare certain foods in the diet kitchens, in which case suitable equipment in refrigerators, heating media, sinks, etc., must be provided.

Before the main kitchen or the service rooms can be intelligently planned it must be decided by those responsible for the administration of the hospital as to the method by which the food is to be distributed to the patients. One factor, however, remains constant, namely, that room must be provided adjacent to the wards for the bedside trays, cutlery, condiments, napkins, etc.

It cannot be emphasized too strongly the importance of having the system of food distribution fully discussed and settled before final plans are prepared.

The problem of delivering hot food to the bedside of the patient is one of the most perplexing, but since the heating media at the disposal of the hospital authorities, and the vast variety of labour-saving devices for preparing food are many and varied, there is no excuse for food improperly cooked or served

The kitchen must be planned for economic service from the receiving of raw supplies to the serving of the patients' trays. In fact the kitchen should be planned on the same principles as a factory for the conversion of the raw product to the palatable food. Cross-current of service should be avoided, such as mixing the washing of pots and pans with the making of "puff paste." When the food is ready to be served it should reach the patient quickly without deterioration.

In the small community hospital the patients' trays can be set up in the main kitchen and delivered from there direct to the patients, or, as an alternative, carried in thermos carriers from the kitchen, placed in the dumb waiters and taken to food service or diet kitchen rooms adjacent to wards or private rooms. In the latter case the diet kitchen should be located adjacent to wards or private rooms, and since it is an important unit of the dietary service careful consideration should be given in the planning of same. As before stated, its location should be near the centre of the unit that it serves, in order to reduce to a minimum the amount of effort necessary to serve trays. It is desirable that the dumb waiter service should either come directly into this room or be very closely adjacent thereto. The floor should be of a type that is easily kept clean and non-absorbent. Floor space of 10 square feet per patient to be served from this kitchen may be taken as an accepted factor for determining the size of the room, with a minimum of 150 feet floor space. (See Fig. 31.)

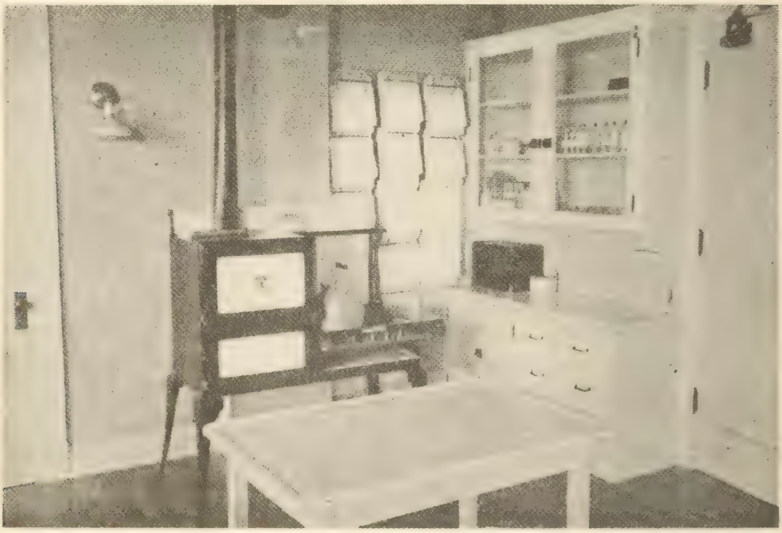


Fig. 31. This spick and span room shows how, in a small building, economy of space may be effected by a combination diet kitchen, drug station, and chart room.

Supplies for the central or main kitchen should be taken care of by the provision of a general storeroom and issued to the kitchen in comparatively small quantities as needed, thus preventing waste, inasmuch as most supplies can be better cared for in storerooms and root cellars than in the kitchens.

Provision should also be made in the vegetable room of the kitchen for the storage of the rough or coarser vegetables to make daily delivery unnecessary, as also since a reasonable stock of small canned goods may be carried in the cook's supply room for emergency use, provision for their care should be made.

The choice of fuel for the kitchen will need careful consideration. Steam should be made use of wherever possible, as it not only serves its special purpose, but if live steam is available, it will be found to be the most economic cooking medium for the range and for bake ovens.

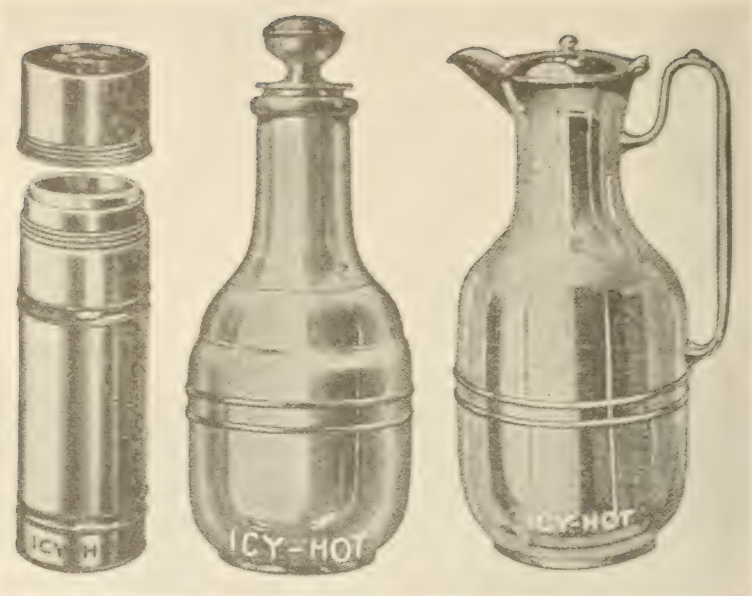
The choice in the final analysis lies between coal, gas, and electricity. Between gas and coal as cooking fuel there can be but little hesitation, unless the difference in the cost is unusually great. For many reasons gas is to be preferred to coal and in many communities will not be found more expensive, provided proper care is taken to conserve its use. Coal at its best is dirty and requires considerable work to keep the bunkers in the kitchen filled and the ashes removed. The fire is not so easily controlled and, consequently, waste of fuel takes place.

Electric cooking is becoming more common every day and it has many advantages over other cooking media. It is the most easily controlled, gives a more even heat than either gas or coal and better results in most cases.

Food Distribution.—Without doubt the modern routine of food service calls for the food to be prepared in a central kitchen, served direct from the range to various containers and then transported to the various wards or floors for service to the bedside, or from special serving rooms or diet kitchens. This routine necessitates a wide range of food service containers and carriages to meet different conditions. Since there is a lack of standardization in such equipment, owing to the wide variety of conditions existing in various hospitals, it is impossible to recommend any particular type of equipment, but rather to present illustrations and descriptions of various types from which the trustees or executive will be able to determine the type or types most comparable to the special requirements of the institution under their consideration.

There are two divisions of equipment, the first, by means of insulation, aiming to retain the original heat of the food; the second providing means of adding heat to the food, thus maintaining proper temperature for serving, but not dependent entirely upon insulation.

The simplest form of insulated food container is the so-called vacuum bottle, which is made of glass or metal with a double wall, in which a vacuum has been created. (See Figs. 32, 33 and 34.) This vacuum insulation successfully maintains temperature for a considerable period. Although intended primarily for the storage or serving of liquids, certain forms of these containers are also suitable for more solid foods, owing to the fact that the original temperature can be retained for long periods. Vacuum containers are more useful for the storage of foods than merely for transportation and service.



Figures 32, 33 and 34. Showing type of vacuum bottle, vacuum carafe, vacuum pot.

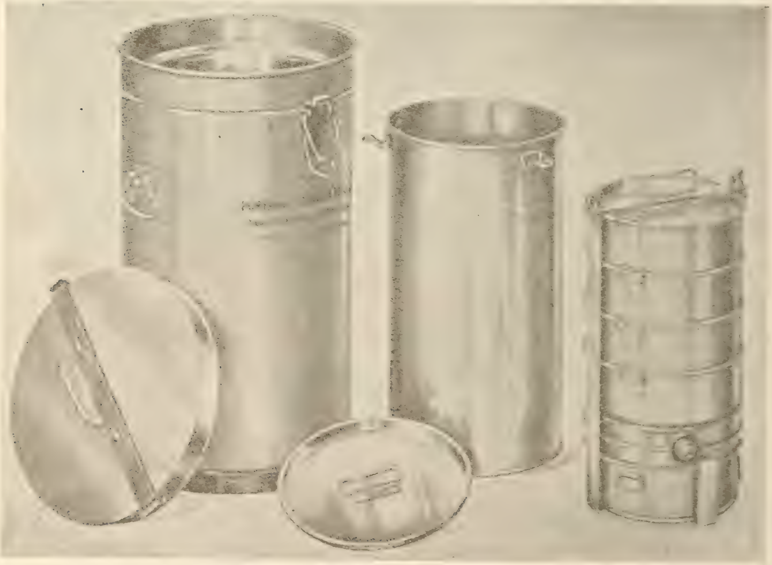


Fig. 35.

It is but a step from the vacuum bottle of limited capacity to the large sized container in which the same principle is employed, the vacuum container being of metal, and in which a number of separate utensils can be fitted, permitting the transportation of these containers a considerable distance without appreciable loss of heat, even after many hours.

Such vacuum containers are made in various sizes holding a number of individual containers, these being as a rule made of aluminum, with tight fitting lids. The food can be either cooked in the small containers, or served direct from the range, after which the containers are stacked in the vacuum insulated holder and then are ready for carrying to whatever part of the institution desired.

There is a similar equipment on the market which is made in a large range of sizes in which the outside container is insulated by a special insulating material instead of by the vacuum walls described above. (See Figure 35.) This illustration while specifically showing the special insulated container is similar in appearance and design to the vacuum container hereinbefore described.

A specially interesting device has been recently placed on the market which is adaptable for food service in private rooms or small wards. (See Figure 36.) While relying on the exterior container for the retention of heat, provision is also made for heating special asbestos pads which add to its heat retaining qualities. This device is suitable only for limited service, as the entire outfit only weighs eight pounds, and is 24 inches high, 12 inches wide and 24 inches deep.

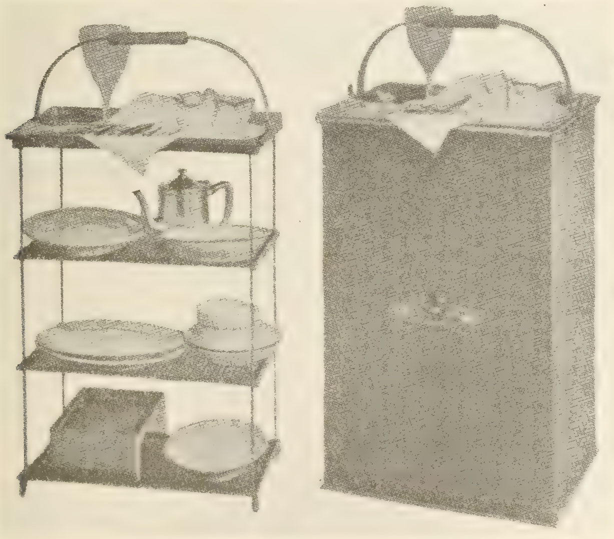


Fig. 36.

The demands for ready transportation are not covered in the portable equipment just described and for which use special waggons must be employed.

Since in the average hospital it is found more convenient to have food service carts mounted on wheels or casters, permitting immediate and ready transportation, food carriages with arrangement of shelves

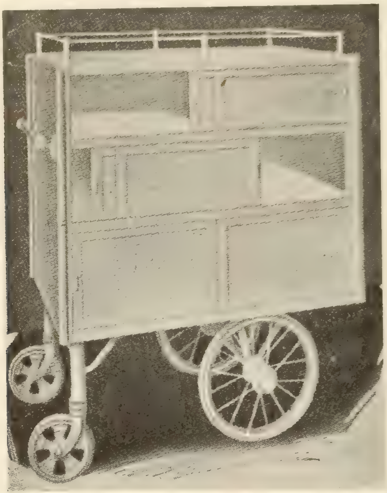


Fig. 37.

and doors would seem to be necessary. The food carriage shown in Figure 37, represents an approved type. It will be noted that this carriage is fitted with sliding doors and has the advantage of not producing the vacuum or pressure that is frequently present in opening and closing hinged doors. The various compartments of this waggon are absolutely separate, being divided with double steel walls, lined with asbestos. The entire compartment is made with double walls on the back, sides, top and bottom, lined with asbestos, retaining heat to a large degree. Various sections are divided by upright walls, so that the tight fitting sliding doors close each separate space, preventing the other compartments from cooling.

A good feature in this particular waggon is that of the rubber corners which prevent injury to the walls. Food can be carried in this waggon in the original containers or in special aluminum containers with inset covers, such as are used in fireless cookers. The running gear it is claimed has many advantages over ordinary four wheel construction, as the weight is carried to a large degree on the larger wheels.

A convenient type of portable electric steam table is shown in Figure 38. The top is of nickel silver finish and equipped with an aluminum coffee urn, two meat jars with covers and four aluminum vegetable containers with gravy pan. This carriage is provided with hot water base, with electric heating units in addition and while designed for bedside service is equally suitable for serving room use.

As previously stated it is impossible to attempt a standardization of food carriages or to recommend any particular type for general use. There are certain outstanding facts which must be considered in the selection of equipment and these facts are based upon the serving routine which is planned for the individual institution.

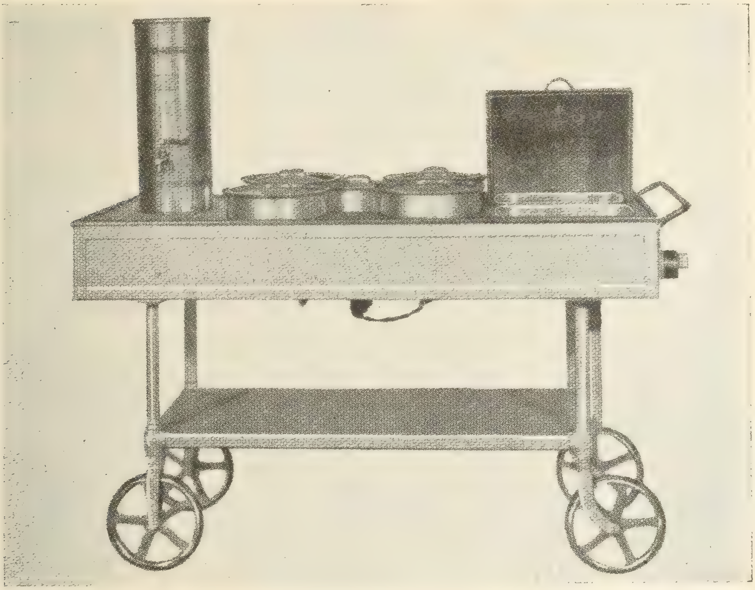


Fig. 38.

Therefore the food service problem in hospitals located entirely within one building resolves itself into three general classifications:—

1. Where bedside service is attempted, food carts should be selected that provide not only method of heat retention, but also facilities for such service, in which case these carts should be centralized in the main kitchen and loaded direct from the range.

2. Where tray service is used, such trays should be made up in the main kitchen, loaded on to insulated food carriages with insulated walls provided with hot water or some other heating element, so that the trays may be loaded on shelves and distributed with the minimum loss of heat. Again, these food carriages should be centralized in the kitchen and the trays made up either from a range or from a special serving table.

3. Where the service is handled from ward kitchens or serving rooms a food carriage designed like a steam table or service table should be installed. This should be equipped with connections for heating by either steam, gas, or electricity. This routine would again call for the centralization of these portable so-called steam tables in the kitchen, where they would be filled direct from the range and then transported to the various serving rooms, where connections of heating units would be made.

Certain modifications or combination of the above suggestions would be necessary to conform to whatever conditions obtained.

Storage of Foods.—Under certain conditions it is necessary to provide for cold storage of food products, in which case it is best to have two sets of storage rooms. One set should be used for storage purposes only, in which the doors need seldom be opened and the contents disturbed as little as possible. The second and smaller set of compartments should be reserved for the daily or current supply and small quantities of products removed to them from time to time from the more permanent storage room. Such a cold storage department for a hospital is shown in Figure 39.

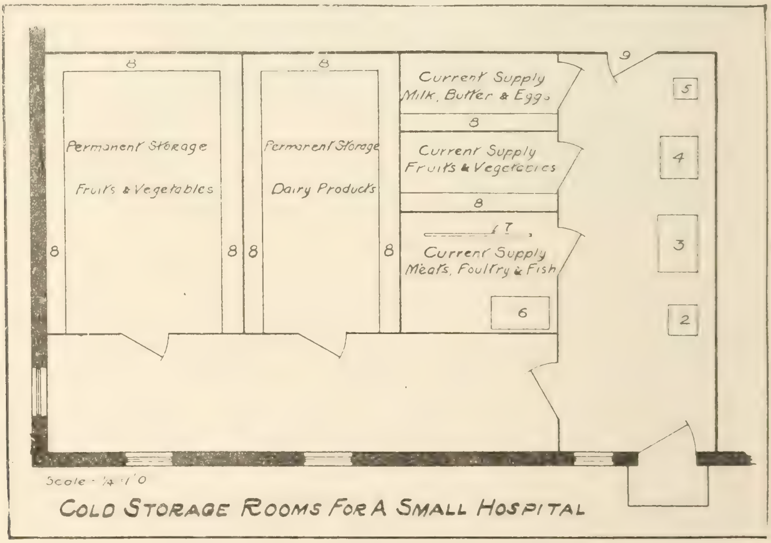

8
8
9
Current Supply Milk, Butter & Eggs
5
Permanent Storage Fruits & Vegetables
Permanent Storage Dairy Products
8
Current Supply Fruits & Vegetables
4
8
7
8
8
8
8
Current Supply Meats, Poultry & Fish
3
6
2
Scale - ¼ - 1' 0
COLD STORAGE ROOMS FOR A SMALL HOSPITAL

Fig. 39.

1. Delivery door.
2. Scales.
3. Meat block.
4. Sink.
5. Meat grinder (electric power).
6. Fish box.
7. Overhead track carrying meat hangers
8. Metal shelving.
9. Corridor to general storeroom.

Since in most hospitals cold storage is carried out to a certain extent, there are fundamental principles which need to be understood, even though food is stored there for only a short time.

The relative humidity of the air is important both in the root cellar and in the cold storage rooms, and will differ for various products, as will also the required temperature.

When the humidity is too low there will be deterioration of the contents of the room due to increased loss of moisture by the products, resulting in shrinkage or wilting, while if it is too high, moisture will be deposited, making conditions favourable for growth of mould and bacteria.

Most of the common fruits and vegetables keep best in a cellar in which the relative humidity is rather high, with the temperature just above the freezing point; although in the case of onions a drier atmosphere is required, as also a little higher temperature.

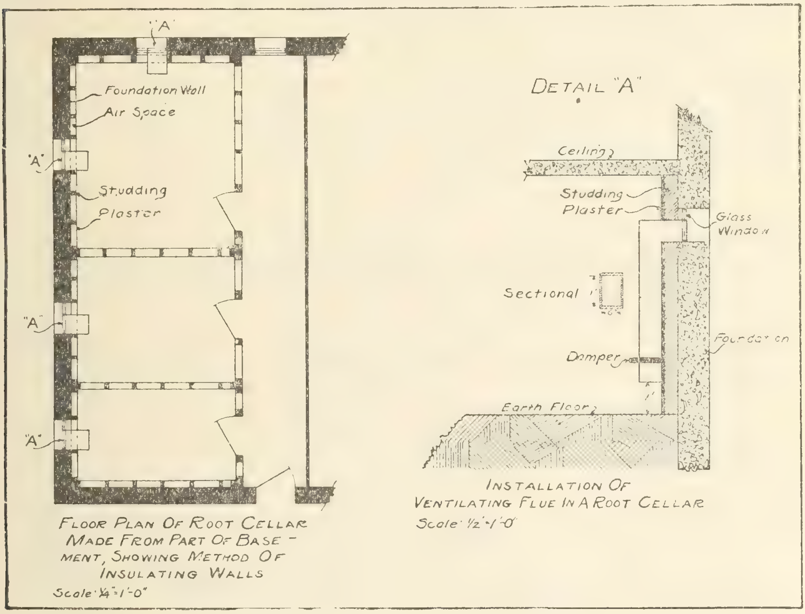


Fig. 40—Floor plan of a root cellar.

Figure 40 illustrates a root cellar in which the temperature can be fairly well regulated.

Refrigeration.—Many factors are involved in the question of the advisability of installing a system of mechanical refrigeration.

If electricity has to be bought at usual rates, and with an operating force in the engineering department as indifferent and inefficient as is often found in the smaller institutions, a mechanical refrigerating plant will not be an economical investment. But, at least, it will be a genuine popular luxury.

There are ice-making refrigerating outfits made in varying sizes on the market of the present day, but the use of such a plant must be governed entirely by local conditions.

Mechanical refrigeration is least advisable where a dependable source of pure natural ice exists in the immediate vicinity.

If natural ice is used an ice-house is obligatory and unavoidably necessitates labour in handling. Nevertheless, such a substantial saving in the operating cost of the institution is effected that it is popular even though primitive.

Laundry.—The hospital should have its own laundry, inasmuch as the linens, etc., are generally in such a condition that a commercial laundry does not care to handle them.

The location must necessarily be determined by the needs of the institution, and in the case of a small community hospital, although preferable to place it in a building separate from the patients, the economic factor would seem, however, to prevent such ideal location. Therefore, if a portion of the lower ground floor or basement of the building is well lighted and ventilated and so planned with external entrances and exits from and to the outside, there would seem no reason why such facility should not be placed therein. (See Fig. 41.)

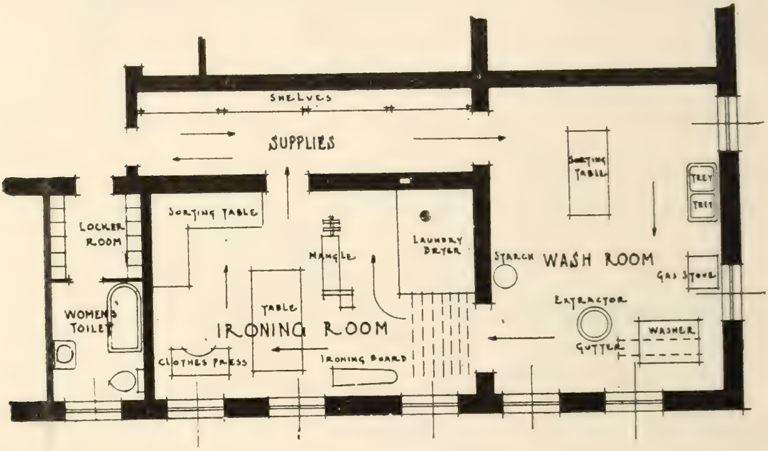


Fig. 41—Laundry arrangement.

The laundry equipment on the market to-day renders it possible for the process of washing, extracting, starching, ironing and pressing to be so planned and accomplished that it becomes an asset to the institution instead of a drain upon its financial resources.

The "wet work" of washing, starching, extracting, etc., should be segregated from that of the drying, ironing work, etc. The plan of the whole of the equipment should be that of the principle which obtains in industrial establishments, namely, the unfinished or unwashed articles passing from machine to machine with the minimum amount of labour and distance until the cleansing and finishing of the fabric is completed.

The floor of the washing room should be concrete or some other moisture-resisting material and the finish of the floor of the section devoted to ironing, etc., should be of a resilient nature—i.e., battleship linoleum or some other mixture of a composite nature.

The disinfection and sterilization of soiled linen is an important subject and one that should be approached cautiously. Since the laundry superintendent or person in charge is not a scientist, the medical staff must be relied upon for specific instructions, if the executive depend on the laundry process to kill germs.

In many hospitals high-pressure sterilizers are installed, but not in buildings such as those under consideration, and since such machines are very expensive, it would seem impracticable to advise the installation of same. However, all goods from contagious cases must be disinfected before the articles go to the laundry, and the process advocated would be that of disinfecting the contagiously infected articles by putting them into a utensil and boiling them. Boiling is better than using germicide, because any chemical combination which is corrosive enough to kill the germs is apt to be of a nature which will do damage to the fibre of the fabrics.

Fly and Mosquito Screens.—The problem of screening as applied to hospitals depends for its solution on many factors, of which the most important is the extent of local sanitation in the hospital area. In preventive medicine the idea of the screen holds first place. The whimsicality of Jonathan Swift is responsible for the reminder that the insect carrier may stay with us " as long as big bugs have little bugs upon their backs to bite em."

The minimum requirement is that screens be placed with an eye to local and sanitary conditions and according to the distribution of insect-inviting material. Toilets come first in the matter of screening, and hardly less important are kitchens and laboratories, dining rooms, wards, operating rooms and laundries.

The screening of a hospital should be considered as part of the general esthetic problem in the planning of the building. Local structural conditions will vary the type of screen, therefore wherever possible the screening of the hospital should be planned for in the office of the architect.

PART III

CONSTRUCTION

In considering the question of new hospital construction the question arises as to whether it shall be of fireproof or non-fireproof type. Very often trustees and individuals, while recognizing the many advantages and great desirability of non-combustible construction incline to the use of non-fireproof or semi-fireproof type, actuated by motives of economy and fear of the difficulties to be encountered in providing the requisite funds. However, where conditions warrant one-story structures, or even one and a half, wooden construction would appear to be permissible from the point of view of the safety of the occupants, but buildings of combustible type even with masonry exterior walls are generally not morally justified in excess of two stories in height.

Favourable initial cost, outside of consideration of the length of the construction period, would appear to be the sole argument in favour of non-fireproof hospital buildings, while the advantages with respect to maintenance costs are decidedly in favour of the fireproof type.

Soundproofing.—The problem of soundproofing in hospitals has received an increasing amount of attention because of the demand for the reduction of noise. The recovery of patients being hindered and sometimes seriously menaced by the prevalence of objectionable noises.

Figure 19 under section of maternity department shows a method of flooring and partition construction which may be carried out with very successful results.

Another feature in soundproofing is that where heavy machinery is placed in the basement. The foundations of such machinery should be insulated from the surrounding structure by a small gap filled in with asphaltum.

Floors.—No thoroughly satisfactory floor for hospital use has as yet been devised. Tile is sanitary, easy to clean, has low up-keep, but is expensive and hard on the feet. Terrazzo will crack and at times will roughen. Wood floors have cracks and require constant attention. Their daily care is expensive. Hospital authorities are generally agreed on the advisability of using Battleship linoleum, or T. M. B. a mastic composition, laid direct on the concrete, or if concrete is not used in the floor construction, on the sub-wood floor. Either of these coverings make a very satisfactory floor covering for wards, bathrooms and corridors. Tiles are recommended both for kitchens and operating rooms.

EQUIPMENT

It is advisable to make sure that unnecessary equipment is not installed, not only to save the first cost, but to avoid the maintenance cost and use of space which such installation would entail. Comparatively simple equipment will meet the requirements of a small community hospital.

Laundry Equipment.—At a recent American Hospital Association's Convention alternative small plants suitable for small community hospitals were the subject of recommendations as follows: Plant No. 1—one 36-inch by 33-inch solid head washer, brass case and cylinder; one 26-inch underdriven extractor; one 30-inch by 42-inch Junior drying tumbler; one 100-inch flat work ironer; one No. 38 press; one ironing board. Each machine to have a motor attached. Alternative plant No. 2—one 36-inch by 48-inch washer, wood; one 26-inch underdriven extractor; one 30-inch by 42-inch drying tumbler; one group drive, consisting of motor and transmission, to drive these three machines; one 100-inch flat work ironer; one No. 38 press; one ironing board.

Where limited funds only are available it may be considered good policy to install the cheaper plant, i.e. plant No. 2, but as is so often proved the more expensive plant is the better investment, inasmuch as it will last longer and be more efficient. The principal difference in the two plants may be briefly referred to as follows:

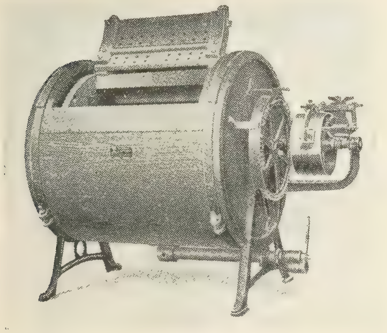


Fig. 42. 24 and 30-inch Globe iron frame wood washer.

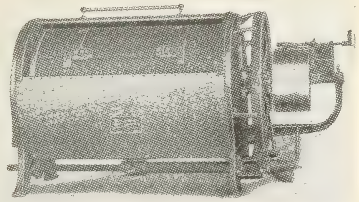


Fig. 43. Showing one compartment, one door, brass cylinder, galvanized tub, single geared, end header, solid head washer.

The equipment referred to in Plant No. 2 includes a washing machine with cylinder and shell made of wood (See Figure 42), while that referred to in Plant No. 1 is entirely made of metal. (See Figure 43). The metal washer will last much longer than the one of wood, and, therefore, is the more economical to buy. Besides this the metal washer is much more easily cleaned than the wood one and hence more apt to be in a sanitary condition. Again, the installation referred to in Plant No. 2 is reduced in cost by having a group drive for the washer, extractor and drying tumbler, instead of having individual motor drive.

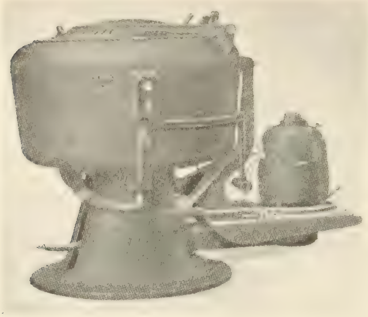


Fig. 44. Attached bracket type vertical motor driven.

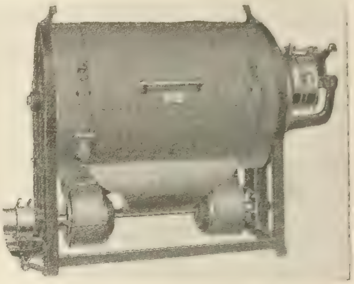


Fig. 45. A new tumbler.

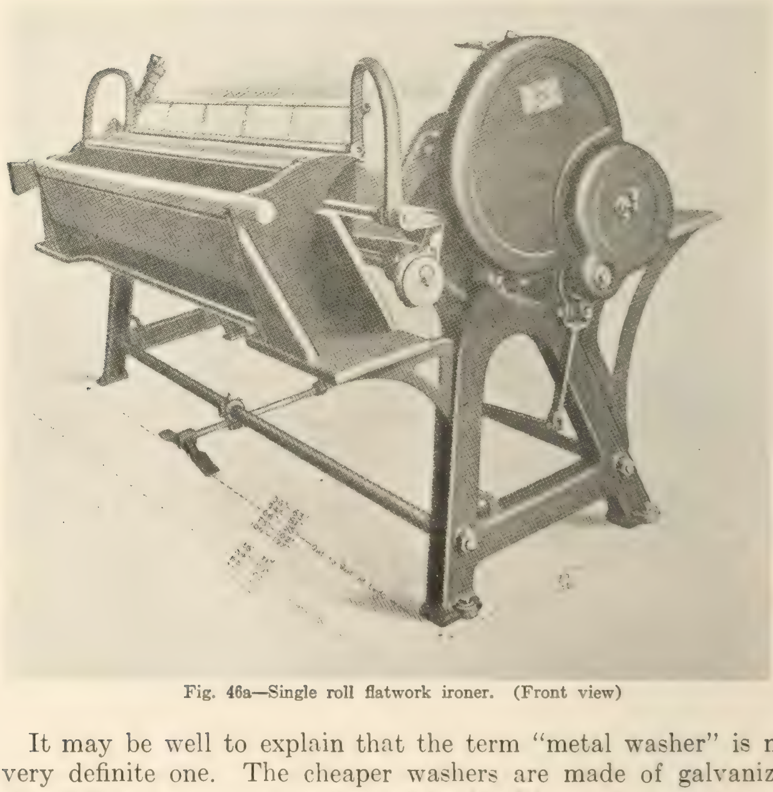


Fig. 46a—Single roll flatwork ironer. (Front view)

It may be well to explain that the term "metal washer" is not a very definite one. The cheaper washers are made of galvanized iron and the more expensive ones are made of brass, bronze or monel

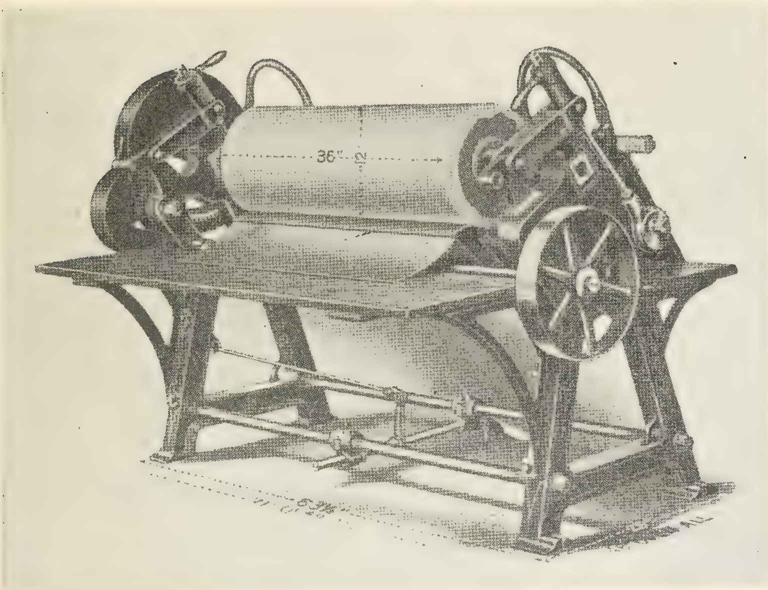


Fig. 46b—Single roll flatwork ironer. (Rear view)

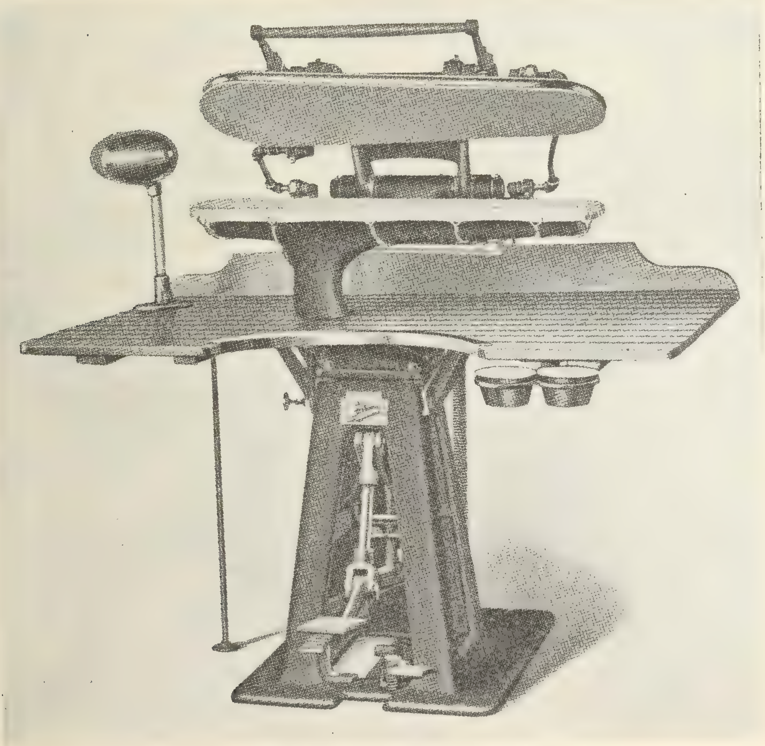


Fig. 47. Unversal press ironer.

metal, a natural nickel alloy. Each of these will last longer than a wood washer, but under certain conditions a brass or bronze washer will last much longer than a galvanized iron machine while the monel metal washer will outlast them all.

It has been stated that where hard water is used the metal of a galvanized washer is protected by a coating of lime and magnesia soap which forms on it and prevents corrosion. When zero water is used this coating does not form and thus certain chemical reactions result. This should not be taken as an argument against zero water. It is rather an argument in favour of the brass, bronze or monel metal machines, which are not affected by water conditions.

Water Softening.—In certain parts of the Dominion where the waters are impregnated with calcium, magnesia, etc., it is almost a necessity, certainly an economic factor, to install a water softening plant. A system for such purposes in use to-day is illustrated in Figure 48, whereby the process of water softening is effected by the water being filtered under pressure through a bed of small particles of a mineral compound, the chemical name of which is zeolite. In composition zeolite is analogous to the feldspars, their chief metals being aluminum, sodium, potassium and calcium. A quantity of particles of zeolite are placed in the filtering chamber of the water softener and as the hard water flows through in a continuous stream it has all of its hardness (kills magnesiums, etc.) removed.

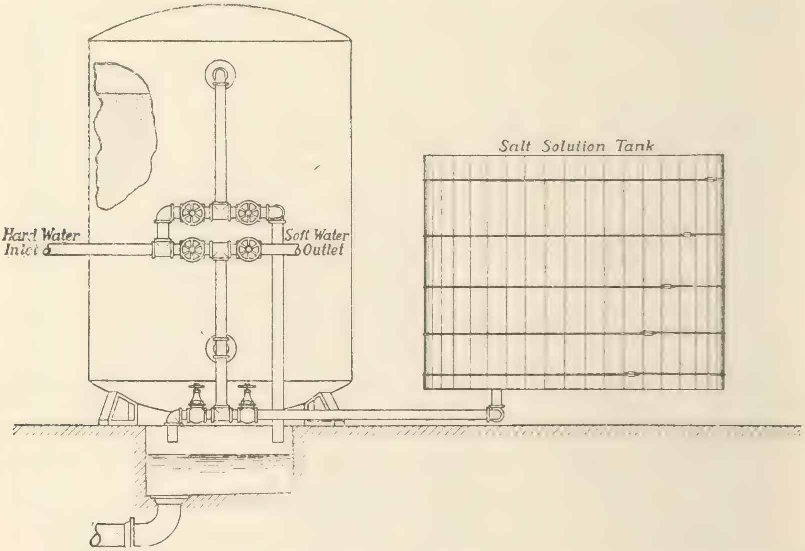


Fig. 48—Standard zeolite water softening apparatus, as ordinarily installed in hospitals.

Harmless salts of sodium or magnesium or both are formed as the hard water passes through the zeolite, an instantaneous chemical exchange taking place, not a reaction.

When the zeolite has neared its exchange limit or the point at which the water ceases to come out at zero hardness, it is refiltered or brought back to its original state by a very simple process, which is the passing through it of a solution of common salt. When the salt solution is run through the zeolite, the reverse of the softening process takes place, that is sodium replaces the destructive minerals that are discharged into the sewer and the zeolite bed is again ready for work. Practically no zeolite is lost through this action, so the only expense involved is the small amount that must be expended for salt. It is only necessary to regenerate the zeolite once each working day if a softener of proper capacity is installed.

Operating Department.—The selection should be left to the surgical staff, but for a general major operation room the following equipment is advised.

One instrument cabinet, one operating table, one stool for the surgeon, one irrigator stand, one instrument stand, one solution stand, with open ring at the top, and cast base mounted on casters, one nurses' table, monel metal top and shelf, size 20 inches by 48 inches, mounted on casters, one table monel metal top and shelf size 20 inches by 36 inches, mounted on casters, one drum stand with two copper nickel plated drums, one drum stand with one copper nickel plated drum, one soiled dressing pail stand, cast base, open ring top with steel porcelain pail.

Cabinets.—Varnished hardwood is the cheapest available material for cabinets and has the merits of standing hard usage for a long time without the necessity of refinishing. However the appearance and construction of these cabinets restrict their use to day rooms, diet kitchens and such other places as do not require strict asepsis. Cabinets for dressings and instruments and medicine cabinets at nurses' station, should be either enamelled wood or enamelled steel; preferably the latter, inasmuch as the construction can be lighter and of better appearance, and more thoroughly sanitary. Heavy plate glass shelves supported on adjustable nickel plated brackets and having Carrara glass bottoms improve the appearance and are more easily cleaned than wood shelves. Instrument cabinets in operating rooms should be enamelled steel with glass shelves and bottom and with drawers below for large instruments. These can be portable or built in with the fronts flush with the wall. Portable instrument cabinets have the advantage of being cheaper than built-in cabinets and of giving more latitude in the placing of the operation room equipment.

Blanket warmers should be portable and of enamelled steel construction. If this amenity is considered when the building is planned, a steel lined and insulated blanket closet can be built into the building. The heating media may be steam, gas or electricity. If high pressure steam is available at all times it affords the best method of heating the blanket warmers if reduced to 35 or 40 pounds pressure as it requires no attention on the part of the nurses. Gas heating is less expensive, where available, than electric heating, but needs attention while the electrically heated warmers do not, further than switching the current on or off.

Laundry Chutes.—The usual method in the collection of soiled linen is that by canvas bags, which bags are held in enamelled iron holders until the bags are full, then closed and sent to the laundry. These bags should be kept in the utility rooms. Infected linen requiring disinfection should be handled separately and not put into the general laundry bags. Although the usual practice is for the bags to be taken down on the elevator, it is a great convenience, and strongly recommended to have a clothes chute, into which the bags can be dropped to the basement, from whence they are taken to the laundry. By this method no contamination of the clothes chute takes place and, consequently, the necessity does not arise for supplying special means of cleaning the chute. The chute should be made of light plate iron with all joints butted and all rivets countersunk so that the interior of the chute may be smooth. The diameter of the chute should be at least two inches greater than the diameter of the bags when filled. Approximately the chutes will vary from 18 to 26 inches in diameter.

Each floor served by the chute should be provided with a door thirty inches high by the width of the diameter of the chute, the frames of these doors being of angle iron and the doors plate iron with spring hinges, latches, and light checks to keep the doors from closing noisily. A plate iron collar, the bottom sloping 45 degrees to carry the bags into the vertical chute should be fixed from the frame of the door into the chute. Since vacuum is created by the passage of the bags down the chute although the clearance around the bags hereinbefore recommended will reduce this vacuum, a further precaution is advisable in the provision of an air inlet about 8 inches square with a wire screen placed in the top of the chute. Means should be provided for arresting the momentum of the falling bags at the bottom of the chute. Other methods of construction of clothes chutes consist of sections of cast iron lined on the inside with glass enamel and provided with a flushing device at the top of the chute and drain at the bottom. The use of a sheet iron lined wooden chute should be avoided.

Dumbwaiters.—Hand operated dumbwaiters are practicable and therefore recommended where the travel is not of more than two or at most three storeys and since the service for a small community hospital is a light one, dumbwaiters operated by hand are both serviceable and practicable. Care should be taken that the installation is fitted with efficient brakes to hold the car at the required stops and the gearing should be as noiseless as it is practicable to make it. The minimum size of car recommended is that of approximately 2 feet by 3 feet by 4 feet high with one hinged shelf and either made of hardwood or steel, except in the cases where food service cars are brought from the main kitchen to the food service or diet kitchens on the various floors, in which case it may possibly require to be increased in size.

Automatic electric dumbwaiters are obtainable and need only be used where the service exceeds that already described.

Nurses' Station.—The Nurses' desk should be enamelled steel with drawers and with two side pedestals, one with grooves into which the chart boards can be slid and the other pedestal with shelves for dressing trays set up all ready for immediate use.

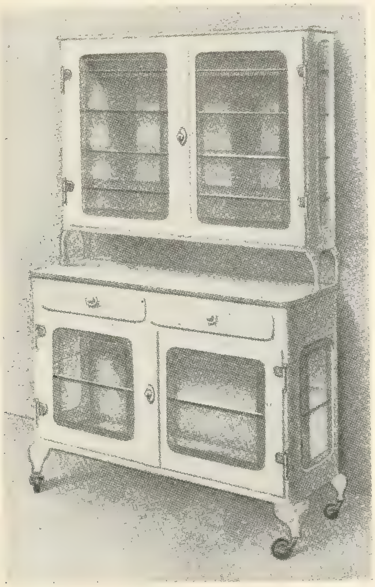


Fig. 49. Medicine and supply cabinet.

The cabinets for medicines and routine supplies (see Figure 49) should be made deep enough to hold flasks and dressings and should have doors with locks. Receptacle for portable desk lamp and pilot light of the signalling system. This should be placed directly before the nurse, a little distance above the desk where it can be plainly seen; outlet for exterior and interior telephones and chair, which latter should be of wood.

Signal System.—The silent electric light system has taken the place of bells or annunciators or combinations of both, which may be found in many of the existing hospitals. The current for this system should not exceed that of ten volts because of the danger to the patient, if he should accidentally receive a shock at a greater voltage from some defect in the push button and flexible connector under his pillow. A silent electric light system necessitates an outlet being provided on the wall at each bed location from which a flexible cord conductor with push button is run to the patient's bed. In wards or semi-private rooms a small lamp on the signal current in each wall-set should be provided so that the point of origin of the call can be determined by the nurse when she enters the ward. A receptacle on the full voltage light circuit should be installed next the signal outlet and under the same plate affording the current necessary for a hand lamp, table lamp or heating pad.

In the pressure of the push button by the patient, a lamp in the corridor would be lighted over the door to the ward or room in which the call originates, also lighting the pilot light at the nurses' station, diet kitchen and other places where the nurse may be expected to spend any time away from her station.

Signal or pilot lights are made with buzzers attached causing either a momentary or continuous ringing, which devices are useful under circumstances where an audible call is needed. However, since the silence of a light signal system is one of its chief points of value the buzzer attachment should be used sparingly.

Signal systems should be installed in conduits similar to the lighting installation.

Clothes Lockers.—Private patients' clothes should be kept in closets built in each room. Semi-private and ward patients' clothes should be kept in a room specially provided on each floor, or better still, in a general locker room provided in the basement. The latter lockers should be enamelled steel with adequate ventilating openings placed in a dry and adequately heated and ventilated room. The receiving department which has hereinbefore been recommended permits of the patients' street clothes being taken away when passing through, put through a disinfector and then placed in the general locker room. Where this arrangement is adopted the patient is bathed and dressed in hospital clothes before being taken beyond the receiving department, thereby minimizing possibility of a new patient carrying infection or vermin into the wards.

Elevators.—The necessity for safe and reliable elevator service is apparent for every hospital of over one story in height, and the only type of elevator to be considered is the electrically driven elevator. Since electric current is available either by direct individual units in the building or from the municipality, motive power whether direct current or polyphase alternating current afford satisfactory results. Of the two, the direct current elevator is preferable, inasmuch as direct current electrical apparatus is quieter in operation than that operated on alternating current.

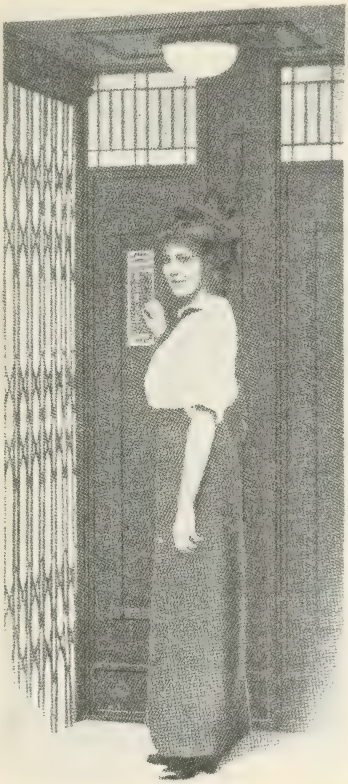


Fig. 50.

The driving or hoisting machine should be in the basement or lowest floor of the building and not directly above the shaft. The machine should be placed on a substantial concrete foundation, which foundation should be kept clear of all footings of the building. The walls of the motor room should be insulated or sound deadened.

The minimum inside size of the elevator car should be 5 feet wide by 7 feet deep in order that stretchers may be carried, attended by one of the staff. Car speeds can be proportioned to the length of travel, and in the case of a building of the height of a small community hospital 100 to 150 feet per minute will be found a practical speed to travel.

The method recommended for car control, since a single installation of elevator would only be necessary, is that of the automatic type with push button control. (See Figure 50.) With this type of controlled elevator any of the hospital attendants can call or despatch the car. Key-operated push buttons may be used at the landings, if it is desired to restrict the operation of the elevator to certain persons, the keys being placed in the hands of those whom it is desired should operate the car. A new device is now on the market for automatically bringing the car platform exactly on a level with the floor at a landing. This device obviates the discomfort to patients on stretchers or in wheel chairs occasioned by the elevator stopping an inch or so out of level with the landing, and also the means of preventing a waste of heavy starting current.

The car should be of plain panelled enamelled steel with an entirely covered roof or nearly so, and a plain thin band of stained and wax-finished hardwood fixed at the height of the hubs of the stretcher wheels. This band takes care of the wear on the car and obviates the continual refinishing necessary where this band is not fixed.

Incinerators.—It is sometimes found expedient to provide one moderate-sized incinerator within the hospital for burning dressings and to dispose of all other waste in a general destructor built outside the building. Disposal of waste by burning it in local incinerators placed throughout the building is not entirely free from objectionable features, such as a considerable consumption of fuel, occasional escape of odours, and the need of repairs from time to time, especially if much wet waste is burned. The disposal of waste in one central incinerator within the building overcomes some of the objections in the use of local incinerators, but since if all the waste of an average-sized hospital is to be disposed of in one incinerator, it is likely to be inconveniently large. Therefore it is advisable to have a general incinerator used for all wastes, except dressings, outside of the building, built of masonry with fire brick linings, double grates and fire bricks. Practically no fuel is required for this type, excepting for starting the operation of the incinerator, as the waste is dried on the upper grate and falls through to the lower one, where it is consumed. The fact of this type of incinerator being of masonry construction. it is not destroyed by the distillates from the waste, even from very wet kitchen waste, and constant repairs are therefore not necessary.

Provision should be made for the temporary housing of what is called garbage in such a way as to prevent its disintegration.

Vacuum Cleaning System.—Receptacles for electrically driven portable vacuum cleaners should be arranged in the building for the purpose of cleaning rugs, mattresses, upholstery and such other material as cannot be washed. An alternative is a central plant piped to outlets through the building, but such an installation represents a considerable cost and not justifiable for a building of the dimensions under consideration.

Sterilizing Equipment.—Since the standardization of modern methods of sterilization has been accomplished, in the general type of equipment offered to-day, the selection should be made on the basis of utility and maintenance. Owing to the constantly changing of personnel and the lack of mechanical experience needed, it should be realized that sterilizers are subject to more neglect and abuse than possibly any other equipment in the hospital.

By careful inspection of design, construction, and material the merits of a sterilizer are usually revealed. More valves and fittings are required for the operation of the sterilizers than for any other fixtures outside of the power plant. When it is realized that for a complete steam-heated sterilizer equipment for a hospital of thirty to forty-bed capacity there are approximately seventy-five valves, all potential points of trouble, subject to unusual performances and entirely outside of the immediate supervision of the engineer's department, it will be obvious that the selection and operation of such equipment should receive very careful attention.

The heating method of the sterilizers will be governed by local conditions and economy. When steam pressure is available at all times (medium steam pressure of not less than 35 pounds, preferably 50 pounds at the fixtures) it provides the logical method. But if it is necessary to maintain the high-pressure boiler plant specially for the operation of the sterilizers, it may more often than not be found that electricity or gas will prove to be considerably more economical. A combination of steam and electricity or gas is sometimes desirable, especially for instrument sterilizers, providing for the use of substitutes when pressure is not available.

Unfortunately heating by electricity involves the prejudice not altogether justified and would at times disparage the many advantages over the gas, more especially since it can be used frequently to advantage in districts where the kilowatt is sold at a low rate. However, the human element in the successful operation by either method must be considered. To wit—the same neglect that causes an electric heater to burn out will also cause as much if not even greater damage to a sterilizer heated by gas. In the case of the electric fixture the cost of repairs is less than in a gas-heated fixture, the reason

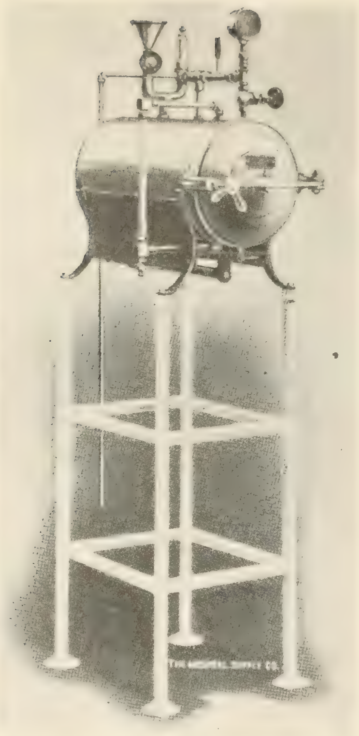


Fig. 51—Dressing sterilizer; electric heated.

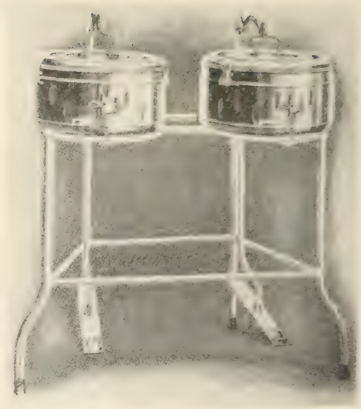


Fig. 52—Dressing drum stand.

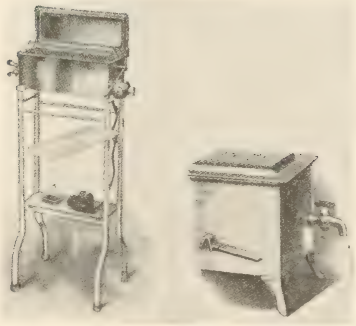


Fig. 53—Portable instrument sterilizer on floor stand. Also rear view showing automatic shut-off.

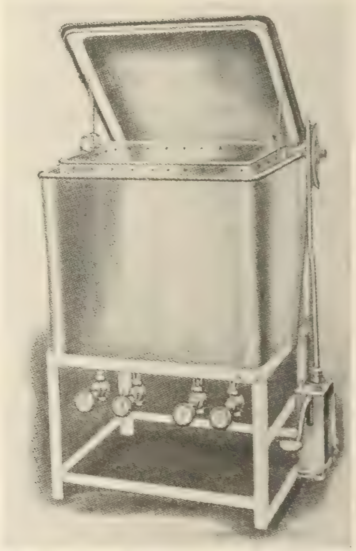


Fig. 54. Utensil sterilizer with oil pump.

being that the damage is localized and necessitates only the replacement of a heating element, whereas the damage caused to a gas-heated fixture may mean extensive repairs.

Typical sterilizing equipment required in a thirty- to forty-bed community hospital may be taken as follows:—

Operating Room

One dressing sterilizer, 16 inches by 36 inches, with automatic control valves. (See Figure 51.)

Two drum stands, each drum of 10 gallons capacity. (See Figure 52.)

One instrument sterilizer, 9 inches by 12 inches by 22 inches. (See Figure 53.)

One utensil sterilizer, 20 inches by 20 inches by 24 inches, mechanical lift. (See Figure 54.)

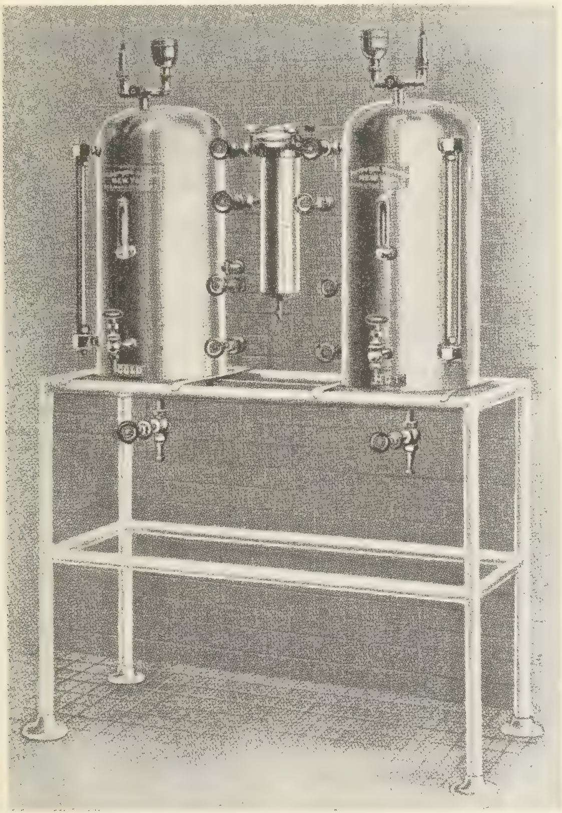


Fig. 55. Water sterilizers, steam heated.

Maternity Department

One pair of water sterilizers, 10 gallons capacity each tank. (See Figure 55.)

One utensil sterilizer, 20 inches by 20 inches by 24 inches

Utility or Duty Room

One utensil sterilizer, 20 inches by 20 inches by 24 inches, mechanical lift.

One instrument sterilizer, electric, 5 inches by 6 inches by 16 inches. (See Figure 56.)

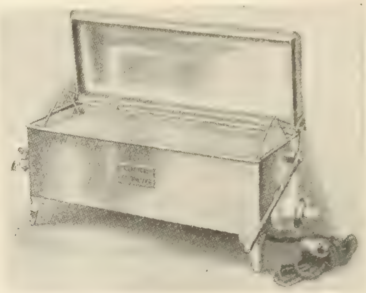


Fig. 56. Portable instrument sterilizer.

Sanitation.—In cases where the hospitals are located in isolated areas and where municipal system of sewage is not available, the question of treating feces from contagious cases is of paramount importance. In such cases without exception the septic tank which would be constructed under the conditions referred to should be arranged with provision for settling, discharge, overflow and treatment tanks. The infected sewage from the building should discharge into the settling tank; flowing into the discharge tank from thence into the overflow tank with proper gradients and thence released into the treatment tank periodically, such flow being governed by necessary valves. The treatment chamber should be fitted with a copper float indicating when the valve of the inlet from overflow tank is to be opened, namely, after the fluid in the treatment tank has been dosed, thence discharged to the disposal area. The dosing formula for such treatment is as follows: 100 part per million of fluid chloride of lime.

Contents of tank to be well stirred and period of exposure one hour.

In sanitation as in many other things the theories and practices change so rapidly that ordinances relating to plumbing are obsolete almost before their enactment. Most laws pertaining to this subject are based on similar laws in existence where conditions may not be analogous to those locally encountered, being accentuated by salesmen to meet the specifications or materials and appliances in the use of which they have a direct or indirect interest.

Therefore, it behooves the architect when designing the plumbing for the hospital to familiarize himself with minute requirements of such buildings and to consider the laws and ordinances as minimum only.

There is involved such a vast multitude of details necessary to attain the desired results that it may be well to consider the subject of sanitation in group classes, such as sewer work, plumbing, plumbing fixtures and gas fittings.

The first two headings would appear to generally include all of the water services and sewer connections to plumbing fixtures throughout. All the requirements for such work are matters of exact computation as to size and location, collectively and individually.

In the case of sewers, under which heading would be included the drainage system, house sewers, vent stacks, branch fixture connections, sub-soil drainage, and the disposal of rain water, the pipes inside the building should be made of iron. There is so much available material at hand setting forth the wares of the highly specialized and standardized industries that it is not necessary in this publication to go into detail concerning the methods and materials to be used.

However there are some points that may be stressed, inasmuch as they should not be overlooked when planning the sewerage system for the hospital. Traps, waste lines and vents of sinks through which acids or strong solutions are poured should be made of ferro-silicon pipe and should terminate in catch basins of the same material, wherein the waste of fixtures may be run for the purpose of dilution of the contents before they enter the house sewer lines.

Unless the main sewer outside the building has a considerable fall there should be back pressure valves placed on all lines where there is any danger of the sewage backing into the building.

Special attention should be given to the laying of floor and area drains of every character.

Refrigerator waste lines should terminate in cast iron sinks and not be connected directly to the sewer.

Clean-out fittings should be fixed at the foot of all waste and soil pipe stacks; clean-outs on all horizontal runs under ground and so located as to give easy rodding access.

Plumbing.—Hospital superintendents make the claim that the most prolific source of increased cost in the maintenance of hospitals is due both to inadequate plumbing installations and to lack of appreciation of the necessity of accessibility. Concerning the latter there is a tendency to over-emphasize it to the extent of extravagance.

The cost of repairing floors and walls of fireproof buildings resulting from replacement or repairing of pipes is so large that the accessibility of piping is being given much greater attention than formerly.

Shafts of fire-resisting materials with metal doors and removable marble floor slabs cost so much more than board panels and floors with wooden covers, that it has become a serious problem.

Where floors are alike in plan, convenient pipe shafts can be built and piping can be repaired or replaced at a minimum cost; but where the floor plans are not alike and it is necessary to build horizontal passages the cost is almost prohibitive and the use of brass or other non-corrosive metal, or the installation of apparatus for removing the corrosive element from water becomes a necessity.

Since accessibility at all times is of paramount importance and inasmuch as it is not good practice to run pipes horizontally in floors if independent risers cannot be provided, then it would be infinitely better to expose horizontal runs on the ceiling of the rooms below.

Where there are only a few fixtures such as in operating rooms it is advisable to beam or entirely suspend the ceiling below such floors rather than to run horizontal pipes in the floors. Where conditions make it obligatory for horizontal pipes to be laid in the floors such pipes should be run in continuous sleeves to allow for expansion and contraction, or if this is not possible they should be protected with galvanized iron, both above and below, so that during the process of pouring the concrete the pipes will not be embedded tightly in the floor material.

The plumbing system of a hospital includes the entire water supply both hot and cold, including the equipment necessary for heating the water in the case of hot water supplies, also storage of both hot and cold water and the necessary connections to the plumbing fixtures and equipment attached thereto, which would also cover the cooking apparatus, the laundry machinery and the sterilizers.

Valves and drains should be installed in the trunk lines of both hot and cold water supplies.

On all branch main lines, valves and drains should be fixed preferably at the foot of each and every set of risers in the building. In addition to these valves without exception there should be provided a valve on each supply at every fixture throughout the building.

All waste lines from kitchens and diet kitchens should have grease traps. Incidentally in most of the Canadian municipalities this is obligatory.

All hospitals should be equipped with standpipes connected either to automatic pump or to a roof tank of sufficient capacity for fire protection. On each floor there should be a hose cabinet or cabinets, fully equipped in accordance with the underwriters' requirements. By so doing protection against fire is assured and insurance rates proportionately lowered, thereby minimizing the maintenance costs.

When dealing with the question of heating the water for hot water supplies, it should be first determined whether this is to be accomplished by direct fuel consumption, high pressure steam, or by exhaust steam. In any case it is absolutely essential that all hot water supply should be of the circulating type in order to facilitate the drawing of hot water immediately at any tap.

Hospital administrators find that the wearing off of the nickel on nickel plated fixtures is a source of constant worry, as also the refinishing of plumbing trimmings. Too much attention is required to keep the brass fixtures polished and, further, such fixtures are subject to unsightly staining and corrosion.

Since maintenance costs are involved in this question it is worthy of consideration, more especially so as the discontinuance of water supply at any fixture, even for a short time, is to be avoided wherever possible.

All portions of the trimmings which come above the fixtures and which are frequently handled should be made of so-called "white metal" and those portions below the fixture may be made of either brass nickel plated or so-called rough brass painted. But where means are available it is well to make all white metal installations.

Fixtures.—All plumbing fixtures should be kept away from walls wherever possible, unless integral backs are supplied and, further, should be kept off the floors to the greatest possible extent. Wall hanging fixtures which have the proper support are much to be preferred to those having any floor connection. This would apply particularly to lavatories, water closets and slop hoppers. (See Figs. 57 and 58.) The object of hanging fixtures is not primarily one of sanitation, but one of expedience in keeping the hospital clean with the least expenditure of time and labour. Bath tubs should be built into the floor at their base (see Fig. 59) and as far as possible be free on two or three sides, so that patients can be readily handled. (See Figs. 60, 61, and 62.)

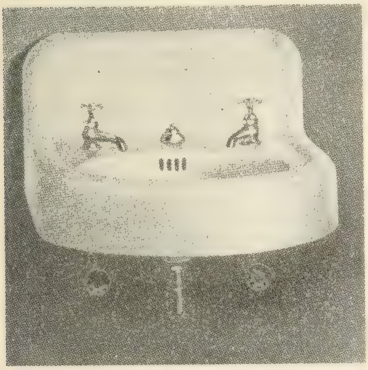


Fig. 57. Porcelain enamelled iron lavatory.

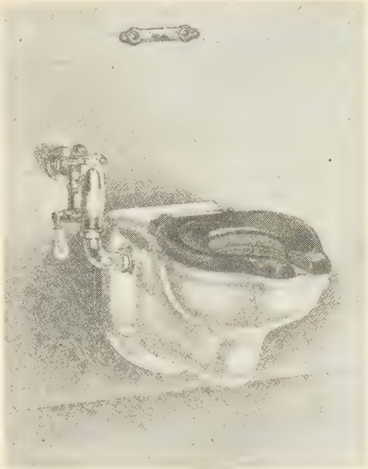


Fig. 58. Noiseless syhon jet wall closet.

It is necessary when dealing with plumbing fixtures to consider the special methods of handling the water faucets or taps, which methods may be enumerated as follows: The form of foot, knee or elbow operating valves is preferable to the ordinary hand faucet for all the fixtures wherever possible. The foot-operating valve should be of the box type, flush with the floor. (See Figs, 63, 64, 65, 66, 67, 68 and 69.)

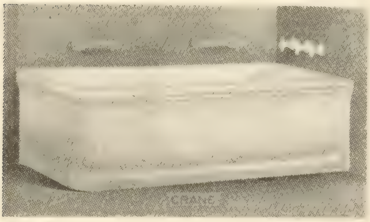


Fig. 59. Solid porcelain corner tub.

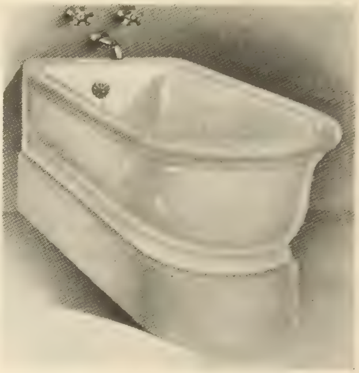


Fig. 60—Solid porcelain bathtub to build in end wall only.

The lavatories should have non-splashing rims and hooded, integral overflows. (See Fig. 70.)

In dealing with water closets the accepted practice in the case of general wards is that one water closet should be provided for each twelve patients and one lavatory basin for a similar number.

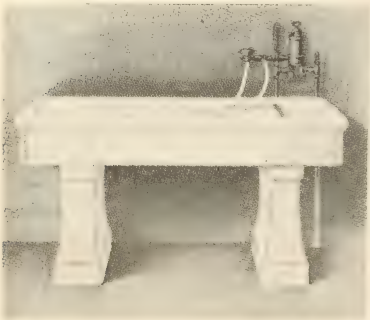


Fig. 61—Solid porcelain hospital infants' bath.

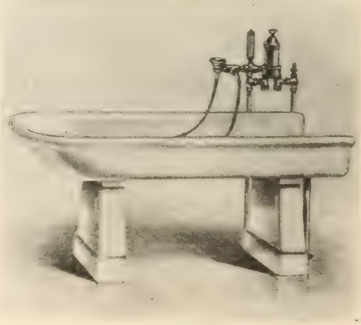


Fig. 62—Solid porcelain pre-natal treatment bath.

It should not be overlooked that a nurses' toilet, consisting of a water closet and lavatory, should be provided on each floor and placed as near as possible to the nurses' station.

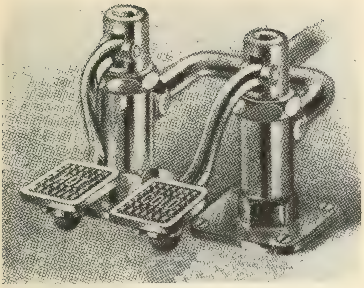


Fig. 63—Pedal supply valves for hot and cold water.

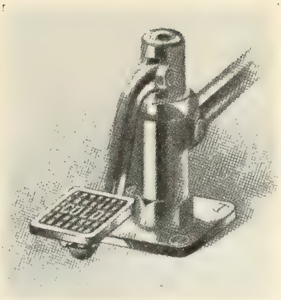


Fig. 64—Self-closing single pedal supply valve.

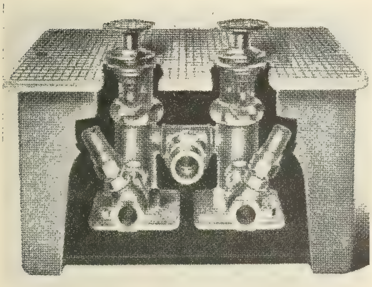


Fig. 65—Concealed self-closing supply valve.

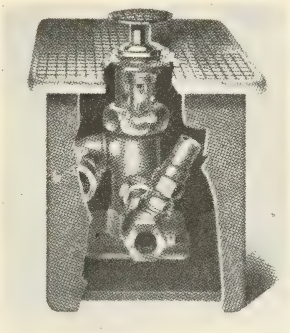


Fig. 66—Concealed single self-closing pedal supply valve.

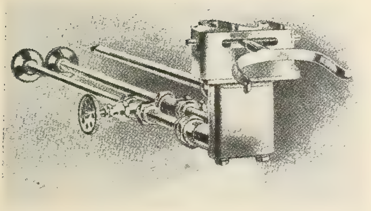


Fig. 67—Knee action supply valve for hot and cold water.

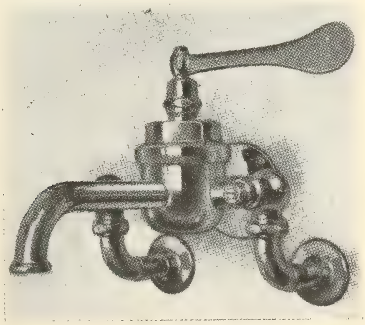


Fig. 68—N.P. brass arm action mixing valve with lever handle.

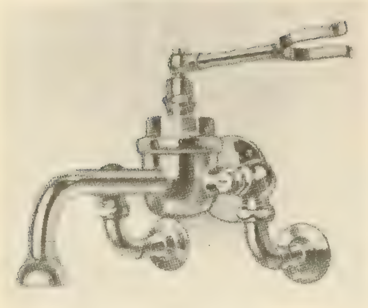


Fig. 69—N.P. brass arm action mixing valve. Prong pattern lever handle.

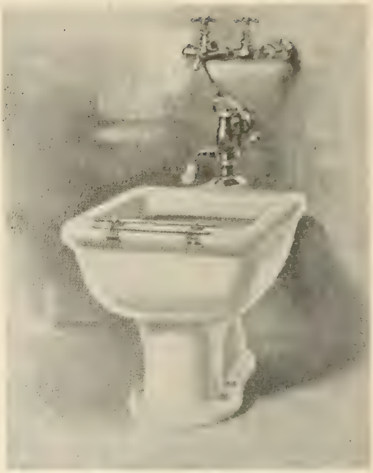


Fig. 71. Flushing rim syphon jet slop sink.

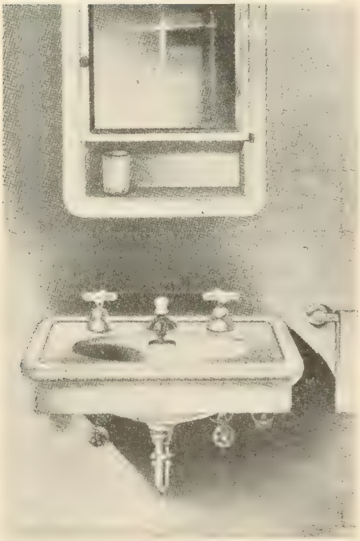


Fig. 70—Lavatory with integral overflow and splash lip.

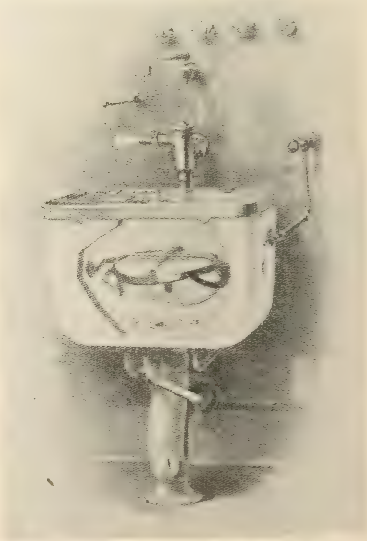


Fig. 72. Bed pan sterilizing slop sink.

A porters' sink on each floor should also be supplied, and this should be installed in a separate space provided for such purposes. Careful attention should be given to the outlets on the sink, which should be fixed at a height to permit pails being placed in the sink. The faucets or spouts should have pail hooks and supports, and the wastes from these sinks of at least 3-inch diameter. (See Fig. 71.)

The plumbing fixtures essential for equipping the utility room should include slop hopper with deep water seal and foot-pedal action, and bed pan sterilizer. (See Fig. 72.)

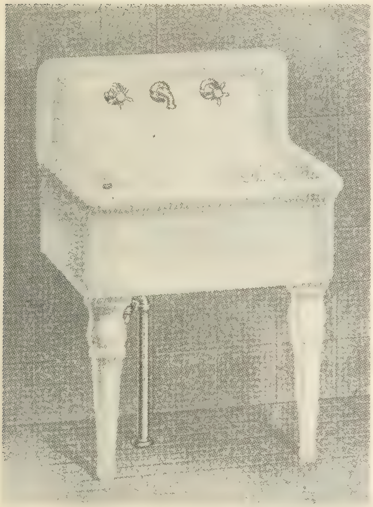


Fig. 73. Vegetable sink.

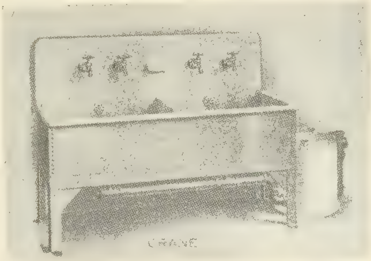


Fig. 74. Galvanized sheet steel scullery sink.

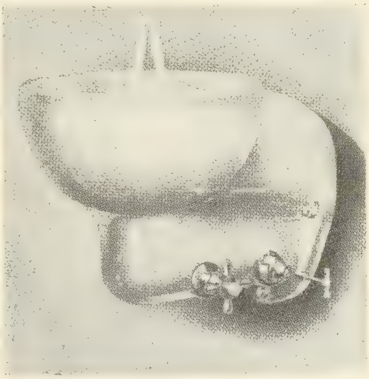


Fig. 75. Wall drinking fountain.

The main kitchen department should be provided with scullery sink, cook's table sink, vegetable (see Fig. 73), poultry and meat-washing sinks. The bakery, if one is provided, should have a sink installed. Where dish-washing sinks and dish-washers are installed, floor drains properly connected are essential. (See Fig. 74.)

Drinking fountains should be of the recessed type and the faucets should be high enough that a pitcher used in drawing water can be conveniently placed under them. The advisability of the installation of bubblers must be left to the discretion of those responsible for the institution.

Operating room sinks should be vitreous or semi-vitreous. Such sinks should be sufficiently large to permit two persons to wash at the same time. Doctors' wash-up rooms should be provided with lavatories (see Figs. 76 and 77) and water closets, and where funds will permit showers, the number being determined by the size of the institution.

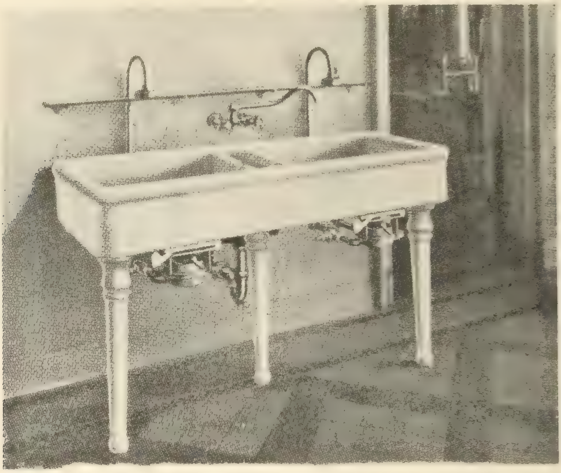


Fig. 76. Two compartment surgeon's scrub sink.

The sterilizing room should be provided with a deep sink with integral dished drain boards and backs, which can be obtained either in enamelled iron or porcelain.

The laundry as before referred to should be provided with necessary gutter, floor drains, and toilet rooms.

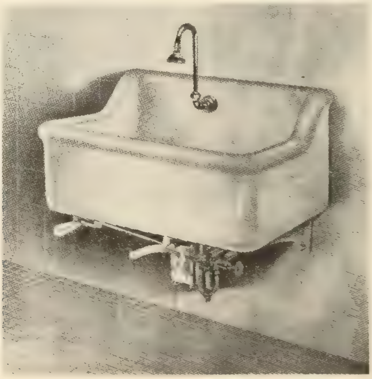


Fig. 77. Surgeon's washup sink.

In the selection of the plumbing fixtures for hospital work there are certain considerations which are not encountered ordinarily in other classes of buildings. One of these is that the hospital must be

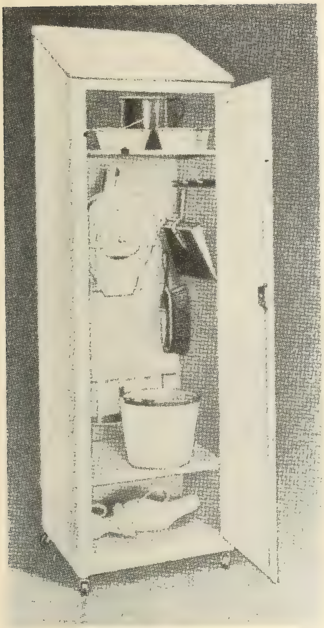


Fig. 78. Utensil cabinet.

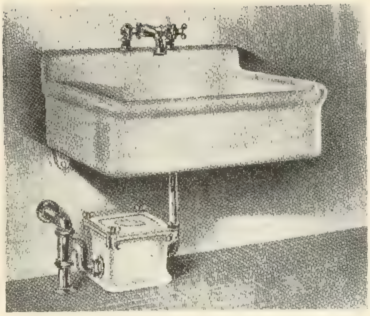


Fig. 79. Plaster sink.

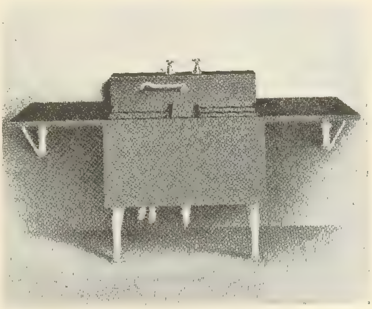


Fig. 80. X-ray sink.

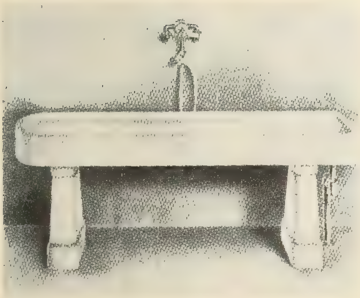


Fig. 81. Autopsy table.

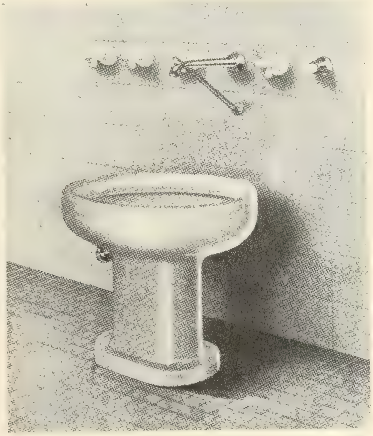


Fig. 82. Rim clinic slop sink and cleansing jet.

used constantly. There is no opportunity for making extended repairs or to shut down any one department for any length of time without crippling the entire service. If there were unlimited means, one could provide for such contingencies by having duplicates. However, such unnecessary expense can be avoided by the simple expedient of installing the proper fixtures at the outset.

Gas Fittings.—Where gas is installed it is desirable that the installation should be carefully laid out. First, exit lights if required by local ordinances. Secondly, irrespective of what character of apparatus is to be used in certain departments, the requirements should be ascertained previous to the installation, so that these supplies will be adequately large. This remark more particularly applies to the piping to service rooms, diet kitchens and main kitchens.

Emergency lights and outlets should be placed in at least one position in each of the operating and service departments of the hospital, also in a few selected locations in each corridor. These emergency lights should be placed without elaboration and with the utmost care to provide temporary light only.

Heating.—The system recommended for general use in small community hospitals involves the use of direct radiation in the room, placed around the outside walls and supplied with either steam or hot water. Hot water, it is conceded, is the better suited for hospital work than steam, since it is possible to vary the temperature of the water in the power house so that the rooms may be kept comfortable whether the outside temperature is high or low without adjusting the radiator valves. Further, hot water gives uniform heat regardless of changes in the firing of the boilers. The radiators not being so hot as with steam, there is less danger from injury to the patients. Hot water can be operated at less expense than steam

Operating rooms, maternity section, nurses' station, and bathrooms require to be kept considerably warmer than the patients' room, whereas on the other hand sterilizing rooms, kitchens and laundries need only to be heated to a temperature of about 50° F. when the apparatus is not working.

A very suitable type of radiator is that shown in Figure 83, wherein it will be noted the radiator is kept 3 inches away from the wall and supported at a distance well up from the floor to permit of cleaning. An alternative to a floor support is a wall bracket, thereby suspending the radiator.

An important point to be considered in the general heating system is that whereby arrangement should be made for heating the operating rooms during periods when heat is shut off from the rest of the building, as also the system should be arranged in sections to enable repairs to be made without interfering with the system as a whole.

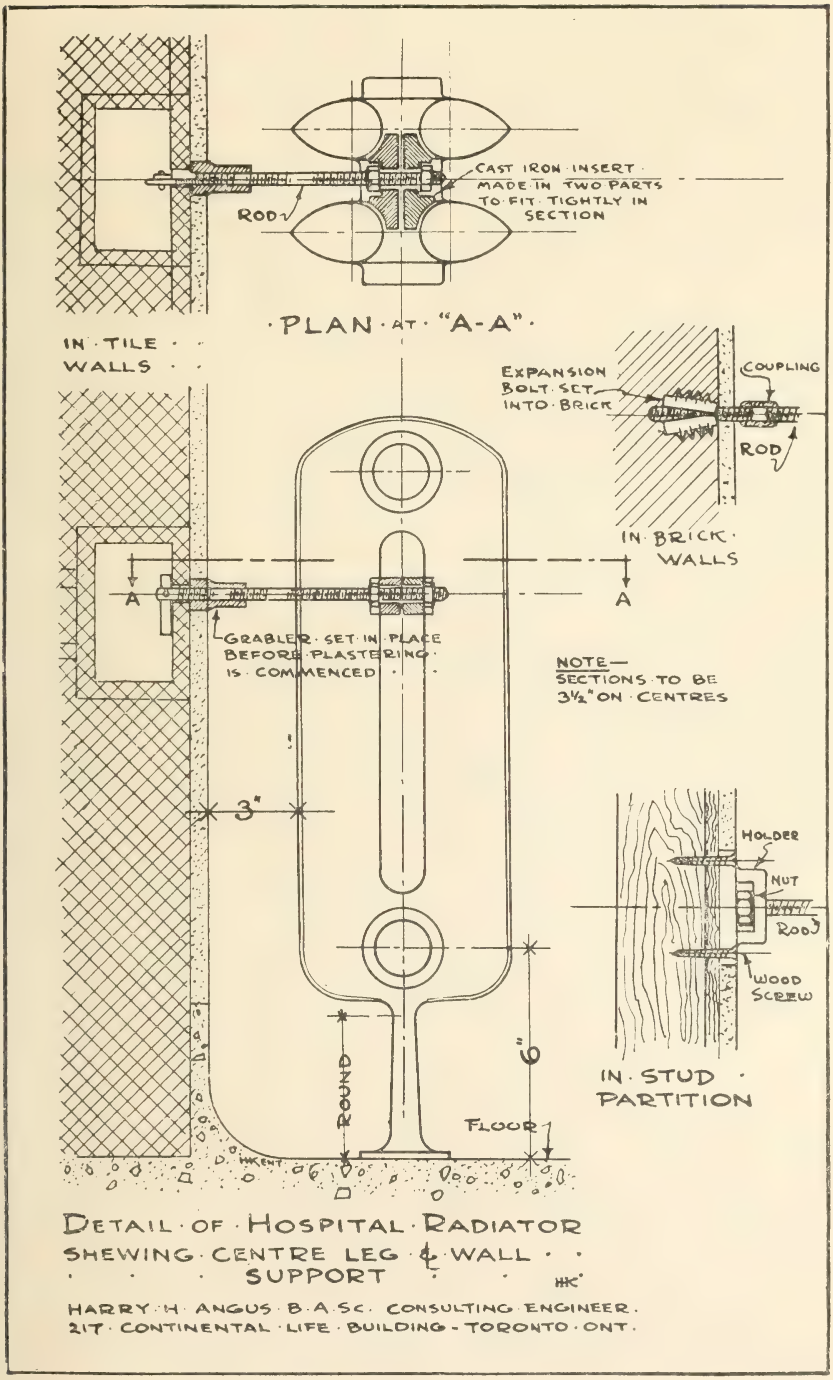

CAST IRON INSERT MADE IN TWO PARTS TO FIT TIGHTLY IN SECTION
ROD
PLAN AT "A-A"
IN TILE WALLS
EXPANSION BOLT SET INTO BRICK
COUPLING
ROD
IN BRICK WALLS
A
A
GRABLER SET IN PLACE BEFORE PLASTERING IS COMMENCED
NOTE—
SECTIONS TO BE 3½" ON CENTRES
3"
HOLDER
NUT
ROD
WOOD SCREW
IN STUD PARTITION
6"
ROUND
FLOOR
H.KENT
DETAIL OF HOSPITAL RADIATOR SHEWING CENTRE LEG & WALL SUPPORT
HK
HARRY H. ANGUS B.A.Sc. CONSULTING ENGINEER.
217 CONTINENTAL LIFE BUILDING - TORONTO ONT.

Fig. 83.

The location of the boiler room should be determined with a view of placing it as close as possible to that part of the hospital which requires the heat as also the accessibility of coal. In view of possible extensions ample provision should be made for the extension of the boiler room apparatus and equipment.

Since hot water is recommended for heating it may be pumped directly through the boilers, and in which case a separate steam boiler must be provided for sterilizing and laundry work.

The installation of meters on the main branch lines are strongly recommended for the purpose of keeping accurate records and enabling those in authority to detect when steam valves are left open or hot water wasted. Since it is necessary to provide steam for sterilizing, cooking and laundry work, and further, to maintain a uniform pressure at the apparatus, it is advisable to carry a boiler pressure of at least 100 pounds, reducing this to pressures as may be required. Since the laundry, kitchen and sterilizers usually are located in different parts of the building it is advisable to have a separate reducing valve and pipe for each of these purposes so that the pressure may be adjusted to give the best results.

Where electric power is generated in the hospital power plant it is advisable to heat as much domestic hot water as possible in the power house so as to use up the exhaust steam from the engines, since during the summer months especially there would be no heating load and therefore no other use for the exhaust steam.

As recommended in another section of this publication concerning the hospital generally the actual design of a heating system for any hospital is a matter requiring experience and technical knowledge, which work should be dealt with by a competent engineer in consultation with the architect.

Insulation.—The climate in Canada is such that conservation of heat is a most important subject and should claim the serious attention of architects and engineers when dealing with the construction of hospitals. As Mr. James Govan very aptly illustrates this point by saying "We are asked to contribute one shovelful of coal to improve outdoor temperatures every time we put one on the furnace for our comfort indoors."

Without sacrificing architectural or aesthetic considerations, it would be possible for the architect or engineer conversant with insulation data to so advise his clients if given the opportunity at the right time to save the cost of his consulting services, as also the cost of effective insulation through the reduction in cost of the heating plant and its operation.

This subject is fully dealt with in Report No. 10, "Fuel Saving Possibilities in House Heating," published by the Advisory Council for Scientific and Industrial Research, Dominion Government, Ottawa.

Ventilation.—Air has two principal functions, one chemical and the other physical—that is it aerates the blood and absorbs bodily heat. In order to perform the first of these it must contain a sufficient amount of oxygen and be free from poisonous gases, and for the second it must have the proper temperature, humidity and motion to carry away the excess of bodily heat. If the air in a room is not renewed from time to time, or a continuous supply provided, its oxygen is gradually consumed and, furthermore, it becomes laden with heat and moisture and is thus finally unable to perform either of its functions.

It would therefore appear more reasonable that ventilating standards, while requiring a sufficient air change to avoid offensive malodorous conditions, should be based primarily on the maintenance of such air temperature, air humidity and air movement as will prove most agreeable and most healthful for the human body. If this view be accepted the really vital problem is to discover by what ventilating method or methods such agreeable and healthful physical conditions of the atmosphere can most effectively and economically be maintained.

The method of ventilating by fans is the standard procedure generally recommended by the majority of ventilating engineers. On the other hand ventilating by the use of window inlets and gravity exhausts is now found very common in the hospital ward and is advocated by many physicians. This latter system of ventilation can be used under a wide variety of weather conditions with excellent results so far as the comfort of the occupants of the ward is concerned. The method avoids the stagnant characteristic of ventilation by windows alone, but does not of course accomplish aeration as complete as that characteristic of plenum ventilation. Ample evidence is available that the diminished aeration does not tend to produce discomfort or to injure the health of the occupants. Some difficulty is experienced from back draughts through the exhaust flues in the use of this system, and because of which fact, shut off dampers should be installed at the exhaust openings so that they may be partially closed off when such difficulties occur. With the temperature maintained in the neighbourhood of 67° F. a very agreeable impression upon the occupants is produced.

From an economic point of view and taking into consideration the various aspects bound up in the small community hospital problem, it would lead one to the conclusion that mechanical ventilation, except under special circumstances, is neither desirable nor justifiable, inasmuch as the cost must necessarily add considerably both to the initial charges and to those of maintenance.

Many manufacturers in Canada specialize in the type of windows, window inlets and gravity exhausts suitable for ventilating small community hospitals.

Decorative Colour in the Hospital

Colour produces mental reactions, which reactions are immediately reflected in bodily condition, partly by the association of ideas.

Black is generally used to denote sorrow, red danger, purple royalty, blue cheerlessness, white sterility.

By association, therefore, colour may produce subjective emotions. The effect of colour may produce real excitement or depression of the nervous system, to wit, one cannot sit in a bright red room for any length of time with a feeling of comfort. Likewise the blue room may be pleasant enough on a warm summer day, but by its great absorption of light and its non-stimulating effect makes it devoid of cheer. Green, however, being restful in effect when used in lighter shades, will make an agreeable surrounding.

Sunshine colours, gold, yellow and buff used on the walls and ceilings in appropriate tones bring something of joy of the sunshine into the hospital.

The hospital 'tis true is a place of suffering, but its chief object is relief of such suffering, and convalesence its important function.

Therefore, the feeling of antipathy for the hospital should not and need not exist. The grim and institutional aspect of the hospital without, and its cheerless, barren appearance within, doubtless is responsible for the dread which so often obtains in the prospective patient.

It would seem that those responsible for hospitals hitherto have devoted the major part of their time and energy (all essentials) to negative conditions, no dirt, no noise, no odour and have been responsible for the oversight of the positive conditions of environment.

Without a doubt the convalescent needs the therapeutic reaction of the positive colours that nature has spread so lavishly and there would seem to be no logical reason why the patients' eyes, which were made to find rest and contentment in soft greens, pale blues, an occasional touch of red, but above all in the glorious golden yellow of the sunshine, should not be satisfied at least, in part, by the careful and selective decoration of the hospital interior.

Since white is dazzling and brilliant and reminiscent of winter's cold and cheerlessness, let the arrangement of colour in selection be that of creating an atmosphere of warmth and quietude together with gentle stimulation that helps the patient along the road to recovery.

First impressions are lasting in effect, therefore the main entrance lobby should be decorated in such a manner as to create an atmosphere of welcome, instead of in appearance being more like a whited sepulchre with "institution" plainly marked thereon. In fact it may be by this very atmosphere of the entrance to the hospital that thousands of sick people prefer to stay at their inadequate homes instead of taking advantage of the care and treatment which only the hospital can give.

Entrance lobbies of small community hospitals should have the same colour schemes, expressing the welcome that is to be found in the entrances to private residences, club houses or community halls.

The ordinary rules of good decoration would demand the use of sunlight tones where the lobby is not well lighted and dull shades if there is an abundance of real sunlight.

The walls of the waiting room for visitors which is generally adjacent to the entrance lobby should be decorated in harmony with a well chosen oriental rug, substantial wicker furniture, upholstered with quaint chintzes or cretonnes, and window hangings to match, thereby making it cheerful and giving it a note of real welcome.

For the private rooms, wards, halls and operating room, if it is intended to use one colour for all, a light warm buff tone is recommended, as this colour has more essentials than any other—to wit:—

1. Proper conservation of light in the room by reflection.
2. Not too easily soiled.
3. Does not produce eye strain.
4. Agreeable and cheering to the patient.

Assuming that variety is required according to use of room and orientation, it is suggested that in wards or private rooms with a northern aspect where the sun's rays seldom enter a deeper yellow tone would be effective, thereby stimulating the sun's glow.

In rooms with eastern and western aspects, where the sun shines for a part of the day, it would be better left the light warm buff.

Rooms with southern exposure, where bright sunlight is enjoyed most of the day, the addition of a little gray or green to the buff colour is recommended, which has the effect of making the colour cooler. Incidentally a french gray is very pleasing for private rooms with southern exposure, particularly if the window hangings, rugs or furniture are influenced by touches of pink. Where natural light is not enjoyed to such an extent a paint of sunlight colour should be applied as also to kitchens, laundries and such other rooms where there is not an abundant supply of sunlight. In fact the same colour as recommended for the rooms of northern exposure could be used in these cases.

Since the operating theatre has highly technical requirements it should have most careful consideration given to its colour scheme.

A great abundance of light without glare must be available for the surgeon when operating.

The practice in the past has been to line the walls with white glazed tile or paint them of the same colour, but the modern hospital of to-day, it is to be noted, invariably introduces colour and texture with less glare.

A very satisfactory finish for the walls of an operating room is that of a dull french gray tiled wainscotting and a lighter gray for reflecting surfaces above, which scheme obviates the visual readjustment necessary to the surgeon on lifting his head while operating and at the same time the light in the room is conserved by suitable reflection.

It would be well while speaking of interior hospital decoration to emphasize the therapeutic value of stencilling on the walls of the different rooms occupied by patients. When the walls and ceilings have been painted the proper tones, steps should be taken to comfort and entertain a convalescent mind by some fanciful leaf bands, punctuated perhaps by bright berries or, perhaps, by suitable conventionalized birds and flowers, and if in the children's rooms; quaint animal forms or brownies. Descriptive, imaginative qualities in the design should be effected in the rooms where the patients necessarily have to gaze on the walls for protracted periods.

The furniture of the hospital might be mentioned while dealing with the subject of decoration, which at once raises the question should only white enamelled beds, bureaus and tables be used.

The iron bed frame owing to its indestructibility and ease of cleaning would seem to be essential for wards and general use, but not necessarily finished with white enamel. Iron beds painted with light blue, grey, green, buff and brown are often seen to-day and are quite as serviceable as white and much more grateful to the eyes of the patient.

Without a doubt private rooms should be furnished on the lines of the home with bed, bureau, table, chairs, etc., of oak, birch or maple, or if preferred tastefully painted wood, unnecessary mouldings and ledges being avoided. To emphasize the homelike appearance of the private rooms, dainty washable hangings at the windows are indispensable.

It should be clearly understood that these recommendations do not necessarily mean that the hospital must be furnished eactly like a home or hotel, but merely as a guide having in mind therapeutic value of consoling and cheerful environment. Such therapeutic effect of a mind led away from its own ennui and burdens is often better than medicines and a contented spirit is one of the steps on the road to health.

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